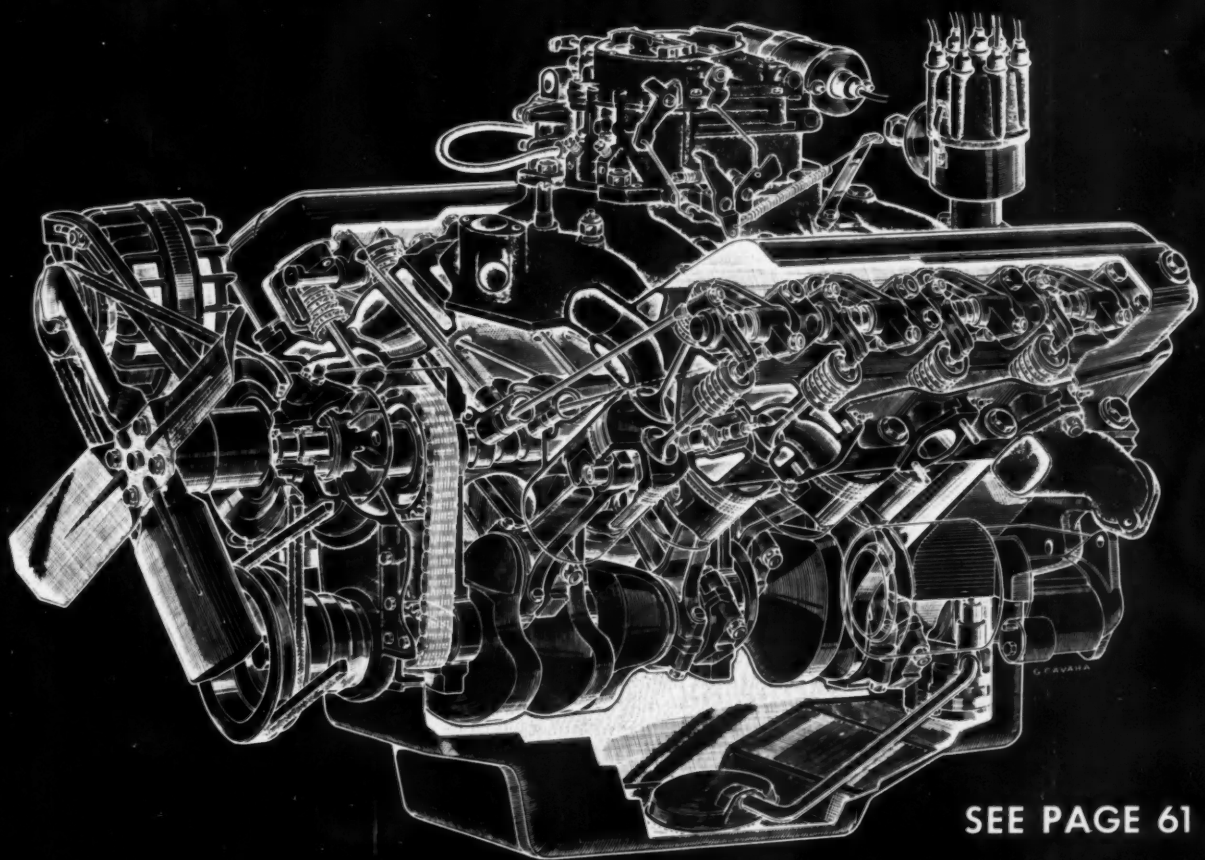
SEPTEMBER 15, 1961

AUTOMOTIVE INDUSTRIES

ENGINEERING · MANAGEMENT · PRODUCTION · DESIGN

A CHILTON PUBLICATION

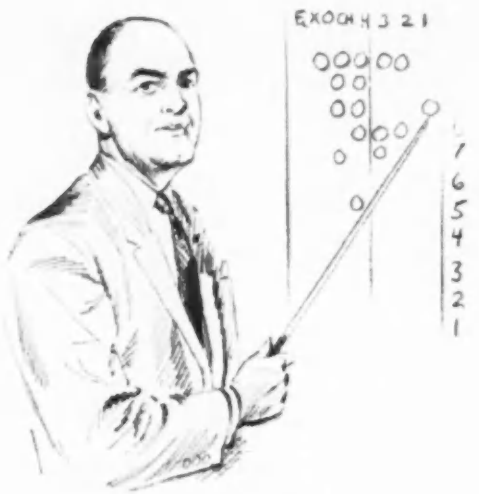
'62 CHRYSLER FEATURES



SEE PAGE 61

Part cutaway view showing details of construction of the 318 cubic inch 1962 Dart V-eight engine

ALSO IN THIS ISSUE . . .



NUMERICALLY CONTROLLED DRILLING...

A short cut to a fast payoff

by Gordon Deagle
Engineer, Bore-Matic Division
The Heald Machine Company

Drilling has long been one of the simplest and most universally used operations in the machine tool field. Furthermore, of the various numerically controlled machines, the *drill* is one of the quickest to return its cost through resultant savings.

This is due largely to the fact that the increased accuracy required in most of today's drilling operations has heretofore been met by building expensive jigs and fixtures. And often these special fixtures have been made obsolete due to design changes long before they have repaid their cost through savings.

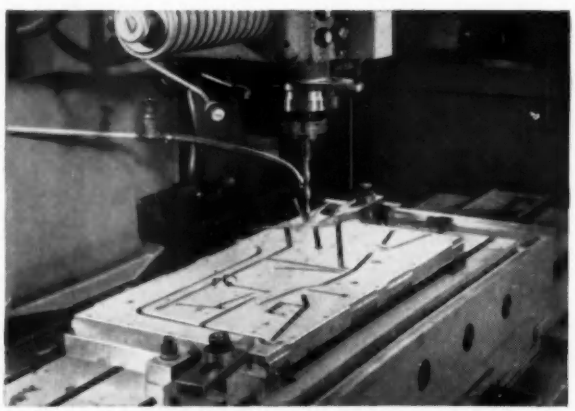
Many people think of numerical control only in terms of very high production. But with drilling this is not the case at all.

The HEALDRILL, a high-precision automatic tape-controlled drilling machine, has been profitably applied on many short run jobs involving frequent changeovers. In fact operating experience in our own drill department proves that the cost savings are even greater where small lots of many different parts are involved than on high production jobs where the expense of special jigs and fixtures might be recovered before obsolescence.

A case in point is the Heald hydraulic valve plate illustrated here in a setup on the machine. A mating pair of these plates forms a multi-channel valve panel which requires 54 drilled holes, 44 drilled and counterbored holes, and 75 holes that are drilled, reamed and tapped. All of these operations are now done on the numerically-controlled HEALDRILL and all cycle functions are fully automatic except for tool changes. Based on manufacturing in lots of 10, with a total of 200 before obsolescence of the part, the HEALDRILL method has saved $39.90 per panel over the jig method. This is a total saving of $7,980.00 on one job alone—almost 20% of the entire cost of the machine!

Hole positioning, feeds, speeds, rapid traverse and full depth limits, and drilling or tapping cycle are selected by the tape and hence are completely independent of the operator's skill, accuracy or speed. Tool changes, when required, are indicated by the machine and can be made in a matter of seconds. And total floor-to-floor time can be reduced by as much as 50 per cent. Changeover to another job requires no setup time except that required to insert a new tape in the control unit and locate the part on the table.

Preparation of the control tape for a new part is fast and relatively simple. With a HEALDRILL, sample and pilot lot production can be accomplished in days instead of weeks, and at minimum cost.



Hydraulic valve panels with 173 holes are precision drilled, counterbored and tapped on the HEALDRILL, at a saving of $39.90 per panel.

HEALDRILL in operation in drill department of The Heald Machine Company in Worcester, producing precision drilled, bored, counterbored, reamed and tapped parts for other Heald machines.

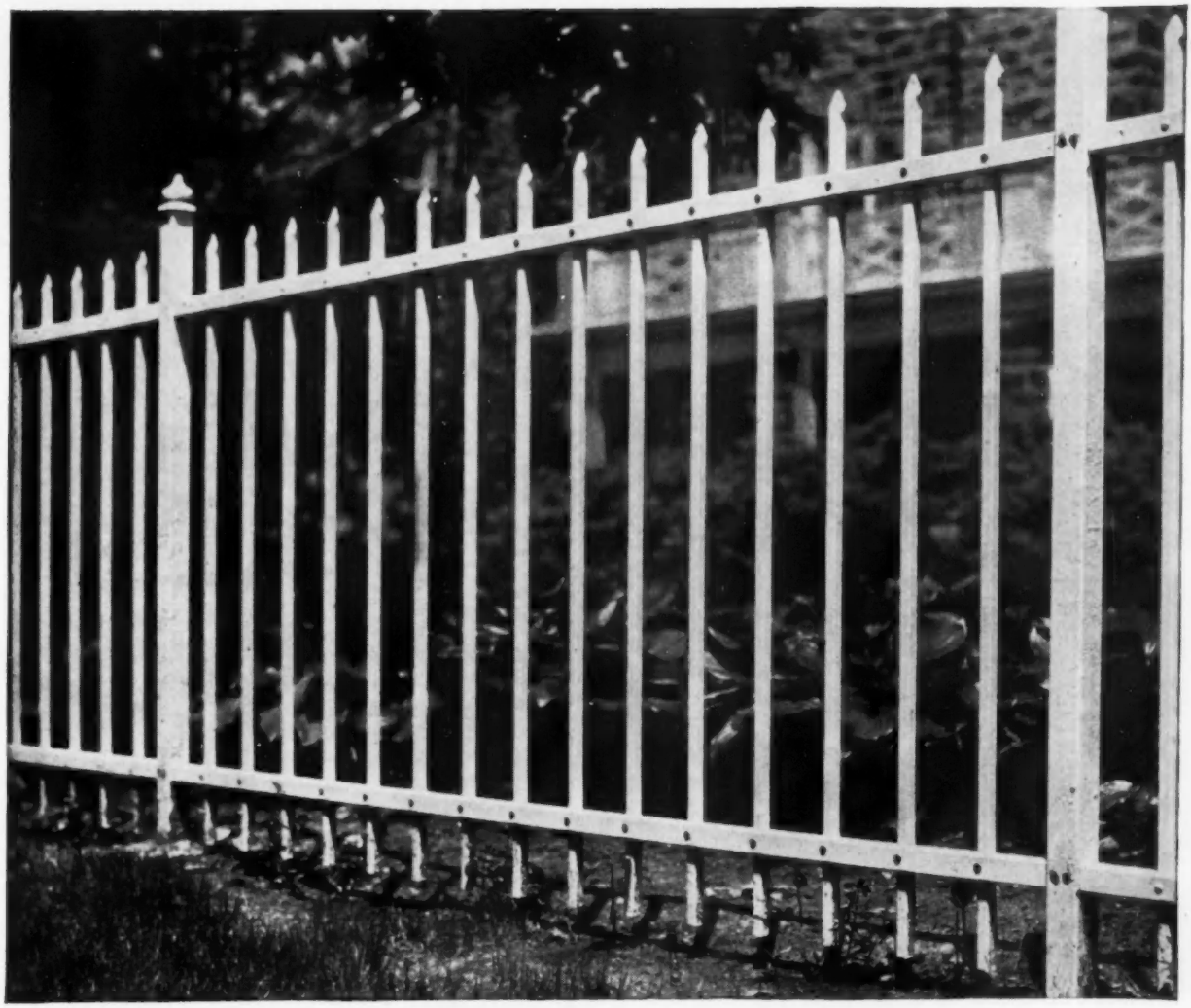
For complete information on the numerically-controlled HEALDRILL contact your Heald engineer—or send for a copy of Bulletin 2-20-48.

It Pays to come to Heald

THE HEALD MACHINE COMPANY

Subsidiary of The Cincinnati Milling Machine Co.
Worcester 6, Massachusetts

Circle 101 on Inquiry Card for more data



New kind of ornamental picket fence possible only with sheet steel

This classic picket fence combines eye-appeal and rugged protection—thanks to the strength and versatility of sheet steel.

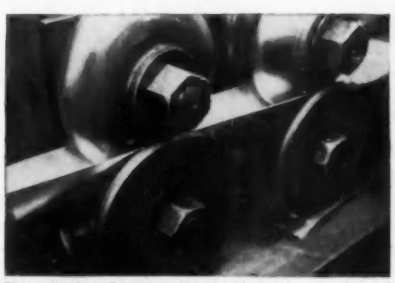
Westmoreland Metal Manufacturing Company, Philadelphia, Pa., fabricates the fencing from coils of Bethlehem steel sheet. Posts, pickets, and stringers are formed into round welded tubing which is then pressed into a square cross-section. The machine that cuts the pickets to length simultaneously forms the pointed ends.

Finished inside and out with a tough vinyl coating, this sturdy steel fence holds its elegant appearance for many, many years. If the product you make calls for strength, durability, easy fabrication, and low cost, what material can possibly match sheet steel?

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Steel *for Strength . . . Economy . . . Versatility*



The mill that forms and welds the galvanized steel strip into tubing also squeezes it into the final square cross-section.

YOU REDUCE COST WITHOUT SACRIFICING QUALITY

when you specify B&W Lectrosonic J.I.C. Hydraulic Line Tubing

J.I.C. Standards for hydraulic fluid line applications now permit the use of welded or seamless steel tubing on an equivalent basis. B&W Lectrosonic® welded carbon steel tubing meets all such J.I.C. Standards—and has been proved by 6 years of rugged B&W field testing. What's more, B&W Lectrosonic tubing is produced under the most rigid quality control procedures in the industry. Tests are made before, during and after manufacture. The key phase: 100% ultrasonic inspection of the weld in line production. The result: superior electric-resistance welded tubing that does the job of seamless while it maintains the low cost advantages of welded.

See how B&W Lectrosonic tubing can meet your hydraulic line requirements. Just call your B&W District Sales Office or write for Bulletin T-435. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA-1009-M

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

SEPTEMBER 15, 1961

Passenger Cars • Trucks • Buses • Aircraft • Tractors • Engines • Bodies • Trailers • Road Machinery • Farm Machinery • Parts and Components • Accessories • Production and Processing Equipment • Design • Production • Engineering • Management

VOL. 125, No. 6

Features • • •

AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sts., Philadelphia 39, Pa., U. S. A. Cable address—Autoland, Philadelphia.

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Second Class Postage Paid at Philadelphia, Pa. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S. & U. S. Possessions, $2.00 per year; $3.00 for 2 years. Canada $5.00 per year. All others $10.00 per year. Single copies, 75¢. Statistical Issue and Products Guide Issue, $2.00 each net. National Auto Show Issue, $1.50 per copy net.

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Low-cost way to reliability in weatherseals...

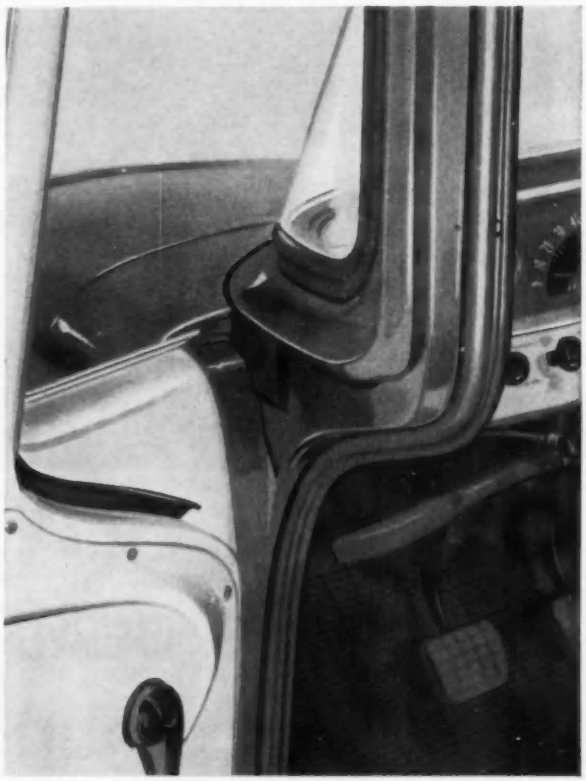
EXTRUDED CLOSED-CELL NEOPRENE

Neoprene's physical properties are reason enough for its success in maintaining reliability in difficult sealing problems. No other sealing material can match its combination of toughness and resilience plus outstanding resistance to oil, grease, ozone, weather and natural aging.

In addition, closed-cell extrusions of neoprene sponge offer you these important advantages: *new design freedom* because extruded seals permit a variety of complex cross sections including hollow bulbs; *low tooling costs* because inexpensive extrusion dies replace costly molds; *low water absorption* because their characteristic closed-cell structure virtually eliminates water penetration.

That's why manufacturers in growing numbers now specify neoprene closed-cell extrusions to prevent leakage, assure dependably weathertight seals in cars, station wagons, trucks. For information write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. AI-9, Wilmington 98, Delaware.

Doors on this fast-selling compact are kept weathertight by a new type of weatherstripping made of extruded closed-cell neoprene sponge. Door seal and windlace are combined in a single piece, resulting in significantly lower production costs.



On this popular line of trucks, unique "self skin" of extruded neoprene sponge permits tighter radius bends to be made without wrinkling. Other applications for this new body sealing material: deck lid seals, roof rail seals, hood lacing, gaskets.

DUPONT
REG. U. S. PAT. OFF.

NEOPRENE
SYNTHETIC RUBBER

Better Things for Better Living . . . *through Chemistry*

GLX-W COLUMBIUM-TREATED CARBON STEEL CUTS DEAD WEIGHT 10% IN NEW

VERSATILITY...
That's the Beauty of Steel

Bringing important new economies to rail shipment of automobiles, this new tri-level auto carrier holds twelve standard cars or mixed loads of 14 standards and compacts. Capacity is increased up to 75%. A unique system of hydraulically positioning the vehicles on three levels gives a clearance of only 16 feet 8 inches, permits use in areas formerly limited to bi-level unit operation because of clearance requirements. ◆ Key feature of the Multi-Car Carrier is the movable decks on which the cars ride. Made of GLX-W columbium-treated steel, the decks are raised and lowered by built-in hydraulic lifts, actuated by a portable power unit. Here light weight was essential, in order to reduce the operating power requirements. Yet great strength was necessary, too, to support the payload. Finally, design of the decks called for eight bends in each section. So formability was also a must. ◆ GLX-W met and exceeded all these requirements. It gives 50-100% greater strength than mild carbon steel, so builder Whitehead and Kales could get the required strength with less weight. Deck operating units need less power,

Great Lakes Steel is a Division of

Multi-Car Carrier built by Whitehead and Kales for Multi-Car Corporation, Detroit, Michigan

TRI-LEVEL AUTO CARRIER

and total weight is reduced approximately 5,000 pounds or 10%. Production is more economical, too, because the ductility and formability of GLX-W permits four of the bends in the deck to be performed in one press operation. ◆ The GLX-W series of high-strength steels consists of fine-grained, semi-killed mild carbon steels, treated with varying amounts of columbium. The high strength of GLX-W permits designers to reduce the amount of steel and effect considerable cost savings when replacing mild carbon steel. GLX-W steels have a low carbon content and are readily weldable and formable. GLX-W steels are available at four minimum yield strength levels: 45,000, 50,000, 55,000 and 60,000 p.s.i. and in sheets, plates and bars. For complete technical information, write Great Lakes Steel Corporation, Product Development, Dept. A1-9, P. O. Box 7310, Detroit 2, Michigan.

A PRODUCT OF

GREAT LAKES STEEL

Detroit 2, Michigan

NATIONAL STEEL CORPORATION

CALENDAR

OF COMING SHOWS AND MEETINGS

Non-Ferrous Founders Society, Annual Meeting, Shawnee-On-Delaware, Pa. .....Sept. 18-20

Steel Founders' Society of America, Fall Meeting, Homestead, Hot Springs, Va. .....Sept. 18-20

2nd Industrial Building Exposition and Congress, New York... Sept. 25-28

American Production and Inventory Control Society, 4th Annual National Conference and Technical Exhibit, Chicago.....Sept. 28-29

National Association of Corrosion Engineers, Western Regional Conference, Portland, Ore.....Oct. 4-6

American Machine Tool Distributors' Association, Annual Meeting, Pittsburgh .....Oct. 4-6

American Foundrymen's Society, 9th Ohio Regional Foundry Conference, Cincinnati .....Oct. 5-6

Society of Automotive Engineers, National Aeronautic Meeting, Los Angeles .....Oct. 9-13

American Standards Association, 12th National Conference on Standards, Houston .....Oct. 10-12

National Screw Machine Products Association, Membership Meeting, White Sulphur Springs, W. Va. .....Oct. 12-15

American Institute of Electrical Engineers, 1961 Machine Tools Industry Conference, Rockford, Ill. Oct. 16-18

Magnesium Association Annual Convention, New York .....Oct. 16-18

American Society of Lubrication Engineers, 8th Joint Lubrication Conference, Chicago .....Oct. 17-19

American Society of Body Engineers, 16th Annual Technical Convention, Detroit .....Oct. 18-20

American Foundrymen's Society, Michigan Regional Foundry Conference, Michigan State U., Michigan .....Oct. 19-20

1961 National Conference on Industrial Hydraulics, "Versatility and Reliability of Fluid Power," Chicago .....Oct. 19-20

American Society for Metals, 43rd National Congress and Exposition, Detroit .....Oct. 23-27

Society for Nondestructive Testing, 21st National Convention, Detroit Oct. 23-27

American Society of Tooling and Manufacturing Engineers, Semi-Annual Engineering Conference, Toronto, Ont. .....Oct. 26-27

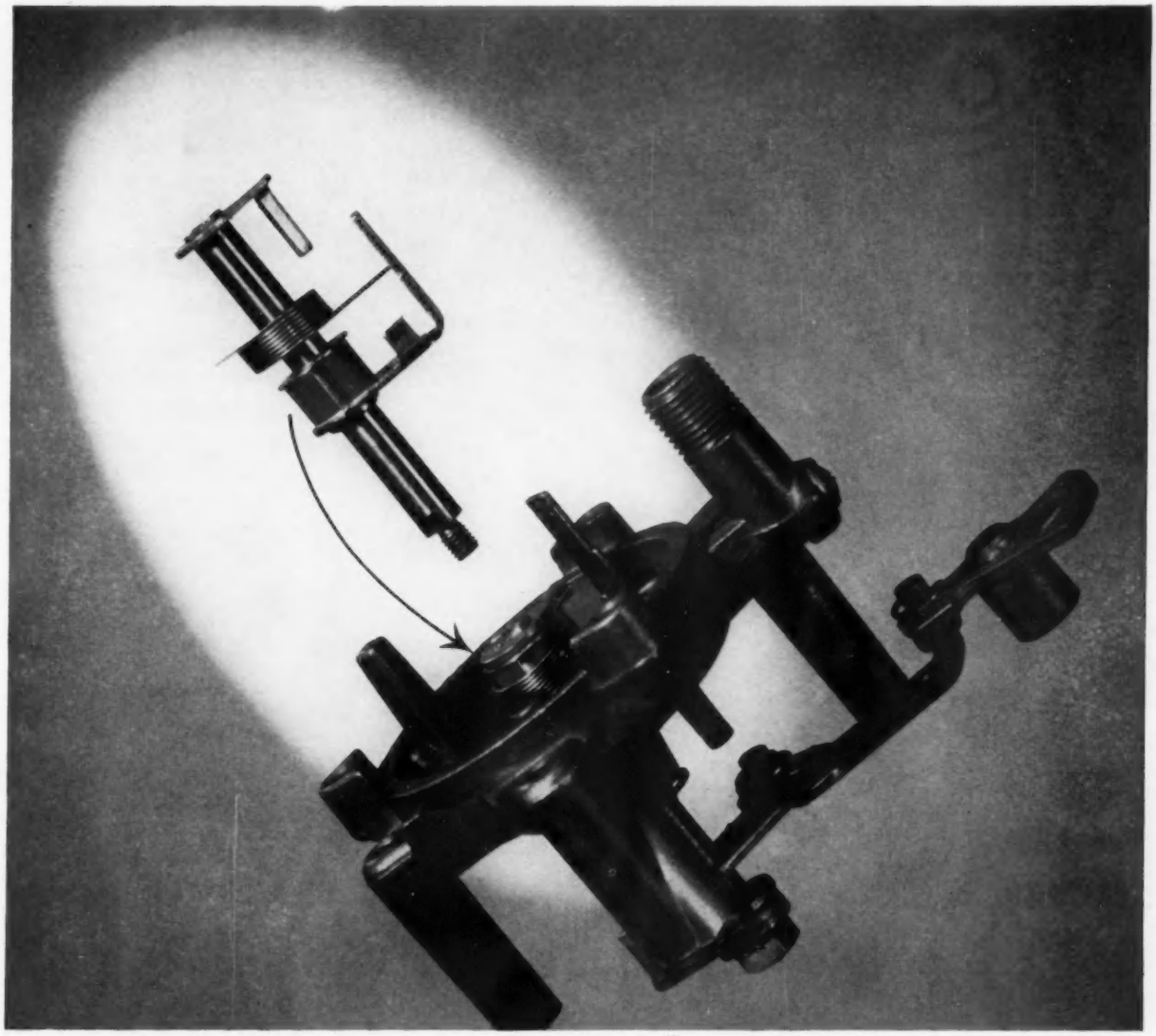
Metal Treating Institute, Annual Fall Meeting, Detroit.....Oct. 26-28

The Material Handling Institute, Joint Industry Annual Meeting, White Sulphur Springs, W. Va. Oct. 29-31

American Gear Manufacturers Association, Semi-Annual Meeting, Chicago .....Oct. 30-Nov. 1

National Metal Trades Association, 62nd Annual Convention, New York .....Oct. 31-Nov. 1

Industrial Management Society, Industrial Engineering and Management Clinic .....Nov. 1-3



Split bearing of TEFLON® provides minimum friction for carburetor torsion spring

In this carburetor choke assembly, the bearing of a Du Pont TEFLON fluorocarbon resin permits the spring to rotate with minimum friction . . . prevents carburetor sticking. The bearing is simply and economically produced by cutting a strip of TEFLON and wrapping around the bushing.

The exceptionally low coefficients of friction, both static and dynamic, offered by TEFLON resins frequently permit the use of dry bearings in places where lubrication is difficult or impossible. In addition, the virtually complete chemical inertness of TEFLON assures that bearings perform unharmed in contact with gasoline, oil, grease and automotive chemicals. And TEFLON TFE resins are rated for continuous use from –450°F. to 500°F. Bearings of TEFLON can be tailored for increased loads and velocities or high wear resistance by the use of filled compositions and reinforced constructions.

For more information about design improvements and cost savings made possible by the use of TEFLON write to: E. I. du Pont de Nemours & Co. (Inc.), Dept. AI-715, Room 2526T, Nemours Bldg., Wilmington 98, Delaware. *In Canada:* Du Pont of Canada Limited, P. O. Box 660, Montreal, Quebec.

DU PONT REG. U.S. PAT. OFF.

TEFLON®
FLUOROCARBON RESINS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

TEFLON is Du Pont's registered trademark for its family of fluorocarbon resins, including TFE (tetrafluoroethylene) resins and FEP (fluorinated ethylene propylene) resins.

Protect bright beauty against corrosion with Double-Layer Nickel Plating

Two durable layers of Nickel under a top coat of chromium assure the lasting beauty of this automotive trim.

- **A thick base layer of semi-bright Nickel provides the basis metal with outstanding protection against corrosion—makes eye-catching beauty last.**
- **A heavy coating of bright Nickel furnishes the lustrous base needed to produce the brilliant chrome finish and adds an extra measure of corrosion protection.**

For example: if pitting through the chromium should occur, this troublesome form of corrosion is slowed down at the interface of the two Nickel layers. It then proceeds slowly along this interface, with a greatly reduced rate of vertical penetration.

This is the kind of corrosion protection that preserves the handsome luster of new car trim. With Double-Layer Nickel Plating on bumpers, grilles, lamp bezels, door handles and horn rings—these and other brightwork parts have a durable, matching, mirror-bright finish that satisfies today's *quality-conscious customers.*

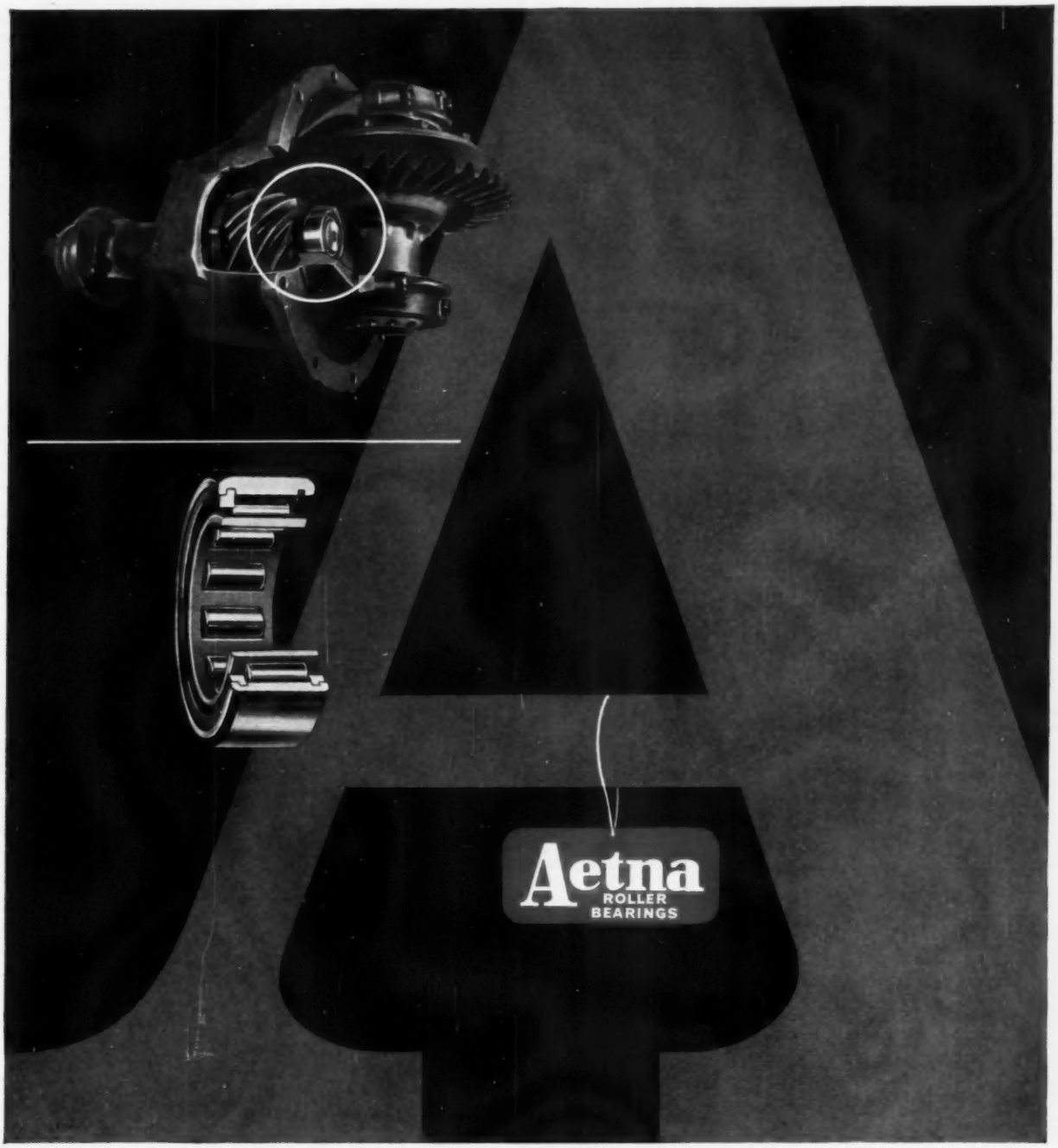
For more information on the performance of double-layer Nickel coatings, write for the booklet, *Decorative Plated Coatings of Improved Durability.* A copy is yours for the asking.

The International Nickel Company, Inc.
67 Wall Street INCO **New York 5, N. Y.**

Diagram shows enlarged view of 3-to-1 optimum thickness ratio for Nickel layers in typical Double-Layer Nickel Plating system.

Inco Nickel

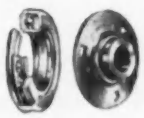
Nickel makes plating perform better longer



FOR FORD... QUALITY, THAT'S ALL For many years, Aetna bearings have been a part of Ford cars and trucks, helping to maintain their high standards of efficiency. In many Fords, Aetna roller bearings are a vital component in the differential. Clutch release bearings by Aetna also assure smooth transfer from low to high speeds. Apply this same anti-friction efficiency and quality to your product. Aetna bearings are available in a wide range of sizes in both roller and ball types, plus many special designs in both pure radial and pure thrust. For details, call your Aetna representative listed in your telephone directory or write for General Catalog and Engineering Manual.

AETNA BALL and ROLLER BEARING COMPANY
DIVISION OF PARKERSBURG-AETNA CORPORATION

4600 SCHUBERT AVE.
CHICAGO 39, ILL.



ANTI-FRICTION SUPPLIERS TO LEADING ORIGINAL EQUIPMENT MANUFACTURERS SINCE 1916

Circle 108 on Inquiry Card for more data

New Light Heavyweight...

FULLER

Models **5-H-74**
5-HA-74*

the lightest transmission designed for diesel engines—from 190 hp to 250 hp

In keeping with the trend toward high capacity, light-weight components, Fuller has released its new Model 5-H-74 5-speed Transmission.

The NEW 5-H-74 offers:

- * **Model 5-HA-74 . . . even *lighter* weight — 93 lbs. less — with *aluminum* case and clutch housing**
- **mainshaft of greater diameter**
- **high capacity mainshaft pilot bearing**
- **wide gear faces**
- **all helical gearing—low tooth pressures**
- **short, quick shifts—jaw clutch engaged**
- **short installation—25 11/64" in length**
- **extremely high ratio of capacity to weight**

SPECIFICATIONS
Gear Ratios

5th	1.00
4th	1.17
3rd	1.98
2nd	3.61
1st	6.60
Rev.	6.51

Weight:
Model 5-H-74—461 lbs.
*Model 5-HA-74—368 lbs.

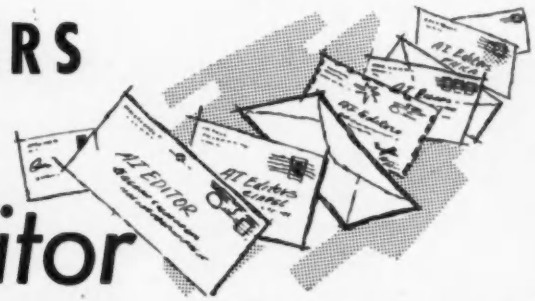
Oil Capacity: 12 quarts.

Length: 25 11/64 inches.

FULLER TRANSMISSION DIVISION
EATON MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Prod. Co., Ltd., Automotive House, Great Portland St., London W. 1, Eng., European Rep.

LETTERS to the Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Pa.

RELIABILITY

We understand from our Quality Control Manager that he has had mentioned to him a publication of yours on "Reliability and Quality Control." We believe that it was referred to in the Correspondence Column of your November 15, 1960, issue.

Would you please be good enough to let us have some information regarding this publication and its availability?

E. L. Richardson
Ford Motor Company, Ltd.
Dagenham, England

● *Information on the way.—Ed.*

TWO CYCLE ENGINES

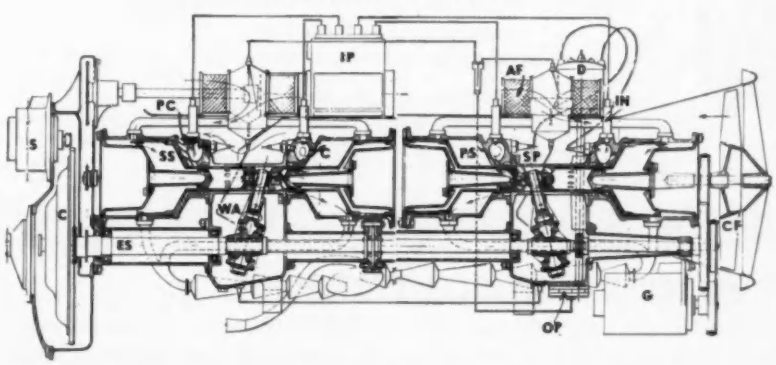
Your article in the August 1 issue of AUTOMOTIVE INDUSTRIES written by David Scott describing the Selwood Rotary Cylinder Engine with orbitting pistons is surely proof that two-cycle engines are not on the end of their development.

I wish to bring up that besides the active Britons and Germans, also in this country we strive to do our part in the further development of the basic two-cycle principle. Enclosed I am sending a copy with a somewhat different approach which is also well mechanically counterbalanced. It works with a volumetric excess of scavenging air, has fully uniflow exchange, and is free of sputtering at idling speeds. These units can be made with any number of piston-spools from one to eight, arranged in barrel form. Each piston-spool is reciprocating by its own power like in a free-piston engine.

Otto V. Drtina, Chief Engineer
Nylonge Corporation
Cleveland, Ohio

● AUTOMOTIVE INDUSTRIES *will provide interested readers with free copy of cut below.—Ed.*

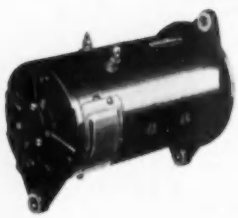
TWO-CYCLE CRANKLESS INTERNAL COMBUSTION ENGINE WITH FUEL INJECTION



LEGEND:

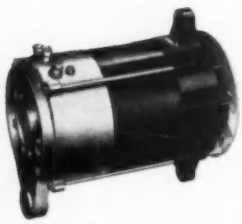
P.C.	Precombustion Chamber	G.	Generator	A.F.	Air Filter
C.S.	Combustion Space	S.	Starter	E.S.	Engine Main Shaft
S.S.	Scavenging Space	IN.	Injection Nozzle	W.A.	Wobble Arm
		S.P.	Spark Plug	P.S.	Piston-Spool
		I.P.	Injection Pump	C.	Clutch Assembly
		D.	Distributor	C.F.	Cooling Fan

KEEP YOUR OFF-THE-ROAD



HEAVY-DUTY, LONG-LIFE D.C. GENERATOR

- Double-length, double-life brushes with constant-tension springs
- Ball bearings with sealed grease reservoirs—need no lubrication between engine overhauls
- 50-ampere maximum output—available with 10-ampere output at engine idle
- Sealed field coils—impervious to moisture and corrosion



SELF-RECTIFYING A.C. GENERATOR

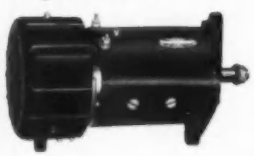
- Built-in silicon diodes eliminate external rectifier
- 30-ampere output at normal engine idle
- 60- or 85-ampere maximum output models available
- Ball bearings with sealed grease reservoirs—need no lubrication between engine overhauls

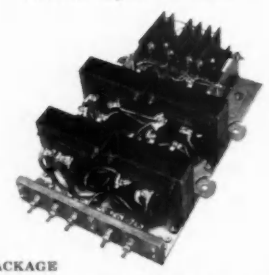
EXTRA-HIGH-OUTPUT A.C. GENERATOR

- 130-ampere maximum output
- 40 amperes at engine idle
- Three-phase a.c. voltage available—ideal for 120-volt conversion as a power source for mobile d.c. power equipment
- Ball bearings with sealed grease reservoirs—need no lubrication between engine overhauls

FAN AND SHROUD ENCLOSED D.C. GENERATORS

- Totally enclosed for protection against foreign materials
- 12-volt—24- and 40-ampere maximum outputs. 24-volt—15- and 20-ampere maximum output generators available
- Double-life brushes and constant-tension brush springs
- Ball bearings with sealed grease reservoirs—need no lubrication between engine overhauls





POWER SUPPLY PACKAGE

- Rectifies and transforms vehicle generator voltage up to 120 volts d.c.
- Furnishes dependable power up to 1200 watts
- Provides mobile power suitable for incandescent lights, universal motors, d.c. motors, a.c.-d.c. radios, resistive loads without thermostats, or other 120-volt d.c. equipment

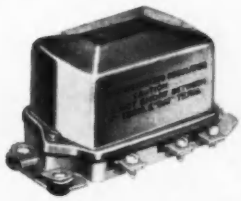
SPECIFY DELCO-REMY POWER-MATCHED ELECTRICAL SYSTEMS!

It's the sure way to prevent downtime and costly repairs caused by inadequate electrical systems. With Delco-Remy's broad line of complete systems and individual components, you can match electrical power exactly to the special needs of your equipment. New design concepts and construction features mean Delco-Remy units last longer, require little or no periodic servicing and deliver more dependable operation under *all* conditions. The particular Delco-Remy system that'll prove

EQUIPMENT ON THE JOB . . .

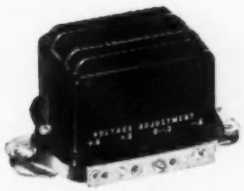
DOUBLE CONTACT GENERATOR REGULATOR

- Double contacts provide better voltage control—longer service life
- Simplified external adjustment feature quickly tailors voltage to job
- Waterproofing insures long life and reliable operation



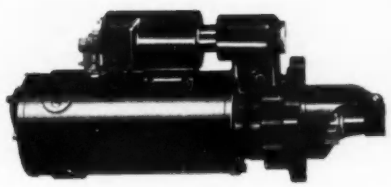
TRANSISTORIZED REGULATOR

- Vibrating type voltage sensor plus single transistor extends service life
- Accurate voltage control at all generator speeds
- Available with simplified external voltage adjustment feature
- Available for either indicator light or ammeter circuits



FULL-TRANSISTOR REGULATOR

- No moving parts to wear out
- Requires no periodic servicing
- Constant voltage control—unaffected by temperature changes, vibration or mounting position
- Simplified external adjustment feature—permits tailoring voltage to operating conditions



HIGH-DUTY CRANKING MOTOR

- New high-performance 12-v. motor eliminates need for series parallel switch circuits with no increase in battery capacity—24- and 32-volt models also available
- Two-piece housing permits 24 different solenoid positions, reduces number of models and spare parts needed
- Totally enclosed drive shifting mechanism is protected against dirt, water, slush and ice
- Heavy-duty sprag clutch remains engaged until engine starts—improves cold weather starting

DC-250 HIGH-DUTY BATTERIES

- Glass mat retainers protect positive plate material—improve cycling ability, provide longer service life
- Resin seals between cell cover and terminal and between case and cell cover protect plates and separators from vibration damage and prevent electrolyte loss
- Newly formulated positive plate material withstands vibration and cycling damage—delivers dependable power during longer life span of DC-250

most economical for your needs depends on your equipment's job and its performance requirements. Ask your dealer about Delco-Remy power-matched electrical systems and specify them when ordering new vehicles. And, to bring your present equipment up to date, contact your United Delco Distributor.

Delco Remy

DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

You don't have to baby it—Ledloy® steel actually performs at its highest efficiency when you really push it! ■ Take a tip from the many shops getting amazing results with this go-the-limit steel. Increased machinability, higher speeds and feeds, reduced tool wear with greater production per tool change—all these advantages are yours—if you push Ledloy steels. ■ Inland pioneered in the making of leaded steels—has the solid background that means dependable recommendations for your kind of operation and your specific product. Be sure the leaded steels you use are Inland Ledloy steels—the result of more than 20 years of research, development and continuous production. Ledloy steels are available from your Cold Drawer or your local Steel Service Center. Send for "Properties of Ledloy Steels," an informative booklet Inland will be glad to mail at your request.

LEDLOY® STEELS CAN TAKE IT!

the world's most machinable steels

INLAND STEEL COMPANY

30 West Monroe Street • Chicago 3, Illinois

INLAND®

A product of

NADELLA

engineering skill

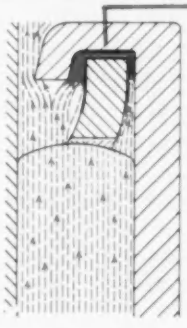
The new

Needle Roller Thrust Bearing

Takes no more space than a washer

Incorporated race
Positive needle retention:
— **easy mounting**

Rugged one-piece retainer :
— **Robust construction**
— **Precision quality**



Accurate, well-lubricated surfaces give positive retainer centring :

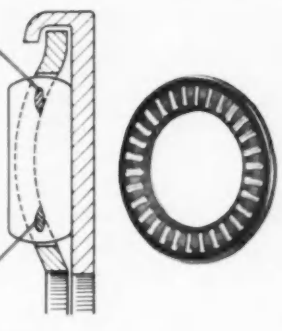
— **No wear of shafts and housings**
(even where not hardened)

— **No overheating**

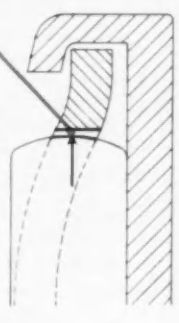
Needles precisely held on their pitch-line and by their tips only :

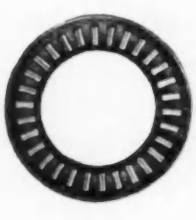
— **No stray load components**

— **Minimum friction, wear and heating**

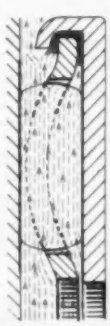


Pivot-like centre point contact only at needle ends :
— **Minimum friction**





Larger number of needle rollers
— **Maximum load capacity**
— **Maximum resistance to load surges**



Generous lubricant feed to contact faces :
Lubricant cannot wipe off, no dry running friction :
— **Suitable for grease lubrication**
— **High speeds without heating or wear**

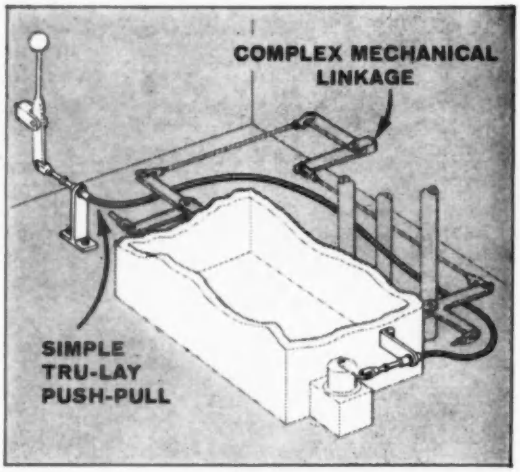
S.A. des Roulements à Aiguilles NADELLA

133-137, Bd National : RUEIL-MALMAISON (S.-&-O.) FRANCE
P.O.B. 27 - Phone. : 967-10.15 (+) - Cable : GUILLAROU-PARIS

TRU-LAY *PUSH*-PULL CONTROLS PROVIDE

Dependable Economical Easy-to-Use REMOTE CONTROL

• If your products involve remote control—electrical, hydraulic, pneumatic or direct—TRU-LAY PUSH-PULL FLEXIBLE CONTROLS can help solve your design problems. They provide positive remote control over long or short distances—up to 150 feet from the control point. Because they operate while flexing, they can snake around obstructions. They will not buckle. They're factory-lubricated for life, unaffected by temperature extremes. They are ruggedly constructed, easily installed and operated, sealed against dirt and moisture, and will handle jobs with as much as 1,000 lbs. input. PUSH-PULL CONTROLS are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Mechanical linkages, on the other hand, are complex. Unlike PUSH-PULL CONTROLS, they are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



CABLE SIZES AVAILABLE

Control Dimension	Minimum Recommended Radius in Inches	Maximum Input Load in Pounds (Dependent on Travel)
3/32"	2	30
1/8"	3	65–125
3/16"	5	115–175
1/4"	6	300–600
5/16"	8	700–1,000

PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY, IMPROVE DESIGN

• Write for your PUSH-PULL Data File. It contains a complete set of engineering bulletins which describe in detail the operation of PUSH-PULL CONTROLS, their applications, features and advantages.

Operating Heads to Fit Your Design for loads up to 125 lbs.

Heavy Duty • For rugged duty, but where operation must be smooth and accurate. Meets all requirements for dependability and life.

Light Duty • Smooth, accurate, dependable performance at low cost. Your choice of several types of knobs.

Selective Friction • Amount of friction can be changed to meet individual requirements. Friction constant at any setting.

Position Lock • A slight turn of the T-type handle locks the control in any position. Two sizes for light and heavy-duty applications.

Micro Control • Push or pull the knob for instantaneous response, then rotate knob for vernier adjustment.

PUSH-PULL CONTROLS

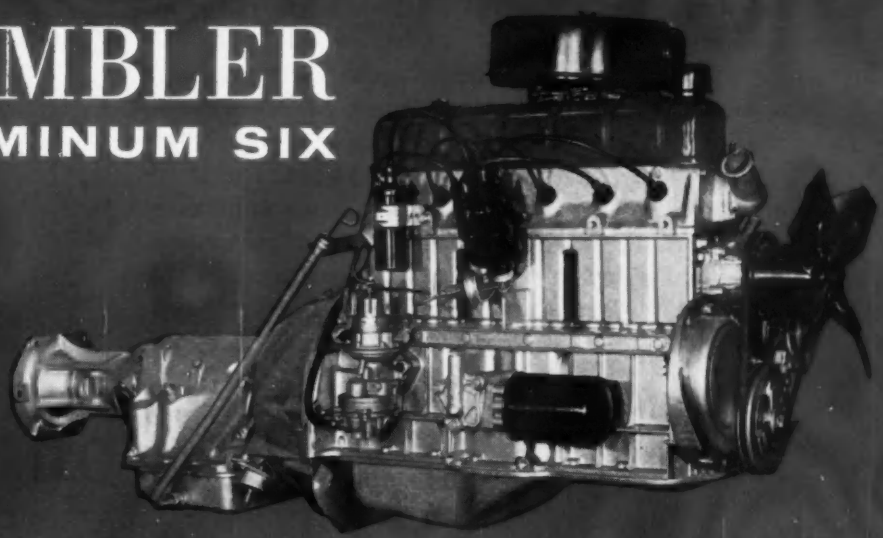
Automotive and Aircraft Division • American Chain & Cable Company, Inc.

601-H Stephenson Bldg., Detroit 2

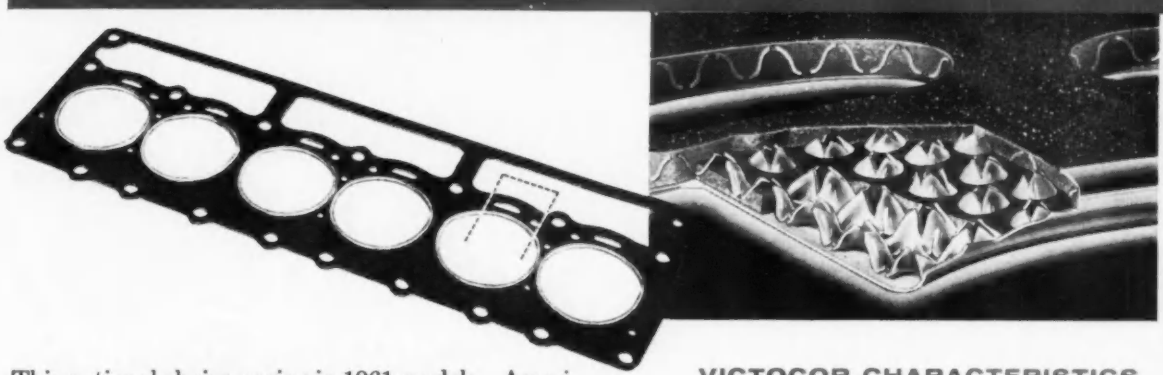
6800-H East Acco Street, Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.

ACCO

RAMBLER
ALUMINUM SIX



sealed with Victocor®



This optional choice engine in 1961 models—America's first die-cast Aluminum Six—is a powerful friend-maker for Rambler. It saves 80 pounds weight—resulting in easier car handling with excellent performance and satisfying economy.

A VICTOCOR cylinder-head gasket seals this fine engine. VICTOCOR's superior compressible and resilient sealing properties are combined with a stainless steel bottom layer that provides maximum heat and corrosion resistance.

VICTOCOR's exclusive metal core-Asbestopac* construction dissipates heat build-up . . . reduces torque loss . . . and maintains dimensional stability. The Asbestopac component retains all coolants.

Synthetic rubber-asbestos sheet packing

VICTOCOR CHARACTERISTICS

Low Torque Loss • High Heat Resistance • High Corrosion Resistance • High Crush Resistance • High Dimensional Stability • Various Gauges Available—as thin as .030-.035

Cross section above shows how thin steel core is die-formed with continuous projections (800 per sq. in.) alternating in each face. Victocor sealing element layers, top and bottom, are bonded simultaneously, mechanically and chemically, into integral structure with core. Deep penetration of core projections increases stability and heat conductivity. The stainless steel bottom of gasket is formed into the combustion chamber openings.

WRITE FOR CATALOG NO. 505A

Available in standard type and modified structures, VICTOCOR gaskets have wide adaptability for automotive and industrial machinery sealing. Consult your Victor Field Engineer, or write on your business letterhead for catalog on VICTOCOR and other superior packings. Victor Mfg. & Gasket Co., P.O. Box 1333, Chicago 90, Illinois. Canadian Plant: St. Thomas, Ontario.

VICTOR

Sealing Products *Exclusively*

GASKETS • PACKINGS • OIL SEALS • MECHANICAL SEALS

Helping to make tomorrow's cars today . . .

Progress report on 4 high

NEW FROM BUDD—an advanced concept in the testing and design of automobile bodies brings road and proving ground *into* the laboratory. Shown here is part of an extensive, Budd-developed instrumentation system that can simulate hundreds of thousands of miles of travel, under the most rigorous conditions, in one-third actual road or proving ground time. In addition to providing quicker answers, laboratory environment permits easier, more accurate evaluation of results. New procedure is readily applicable to any automobile—can effect substantial savings in time and costs in the efficient design of new bodies.

A BUDD TECHNICIAN TESTS the application of adhesive for the bonding of automobile door components. As yet not widely used in the automotive field, adhesive bonding holds great promise for increasing flexibility in the manufacturing process—broadening choice of materials, such as aluminum and steel combinations, newly developed plastics, etc. In helping to overcome current problems, Budd research opens up a new method for producing a better product more efficiently and economically.

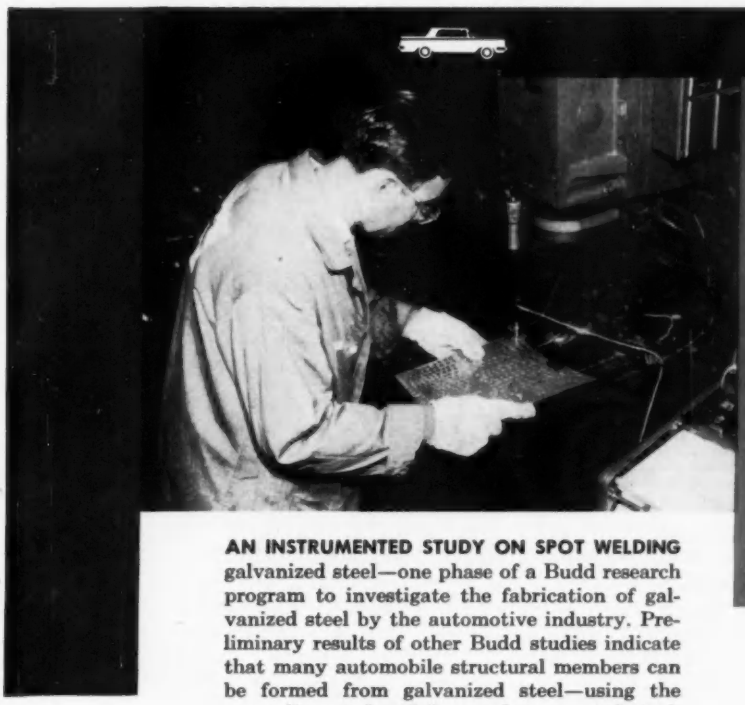
"AUTOPIA" a new sound film in color—tells the complete story of our automotive facilities. If you are interested in seeing this film, write on your company letterhead to Sales Department, Automotive Division, The Budd Company, Detroit 15.

The research projects reported here are but four of many currently underway at Budd that offer a high potential for the entire automotive industry. Objectives—to improve manufacturing procedures . . . increase quality . . . lower costs. As one of the largest independent automotive suppliers in the world, Budd has always sought new ways to provide better products. Past Budd research has paid off in such diverse areas as the all-steel body and current techniques of resistance welding used throughout the automotive industry. Such research is but one of the many ways Budd serves the automotive industry in helping "to make tomorrow's cars today."

potential research programs

Budd Automotive

DETROIT • MICHIGAN



AN INSTRUMENTED STUDY ON SPOT WELDING galvanized steel—one phase of a Budd research program to investigate the fabrication of galvanized steel by the automotive industry. Preliminary results of other Budd studies indicate that many automobile structural members can be formed from galvanized steel—using the same dies employed for regular uncoated steel. Research of this kind will eventually lead to the mass produced, completely corrosion resistant cars of the future.

ULTRA-HIGH-SPEED PHOTOGRAPHY OF ARC WELDING PROCESS—part of Budd's study of new arc welding techniques, processes and equipment in order to broaden the knowledge of these methods in automobile body fabrication. A major objective—to exercise complete control of these processes as applied to high production quality welding. Eventual benefits to the industry will include greater fatigue resistance, savings on weight, reduction of rejects, much higher corrosion resistance.

MAHON'S INDUSTRIAL EQUIPMENT DIVISION . . .

designs equipment but engineers results

from start to any finish your products require . . . in a coordinated, fully responsible, one-source service

The 'finishing touch' of Mahon means more than just painting equipment—it means peak-efficiency methods for the best finishing of quality products. Mahon's Industrial Equipment Division provides a unique one-contract service that is safe, sure—and more often than not, the most economical—answer to any industrial finishing problem. Mahon's multiple-area benefits are worth investigating. Get in touch with Mahon and prove it for yourself.

Mahon industrial equipment

complete finishing systems • metal-cleaning equipment • pickling equipment • painting facilities—spray, dip and flow coating • drying and processing ovens • special process equipment

2 fabrication
of approved design is made, tested, shipped and installed by one organization—Mahon . . . to facilitate use.

3 erection & installation
of equipment and structures is speeded by skilled Mahon crews, completely familiar with finishing systems.

4 service
by Mahon means constant, trouble-free production of your quality products for maximum investment return.

WRITE FOR MAHON CATALOG A-861—ALSO IN SWEET'S P. E. FILE

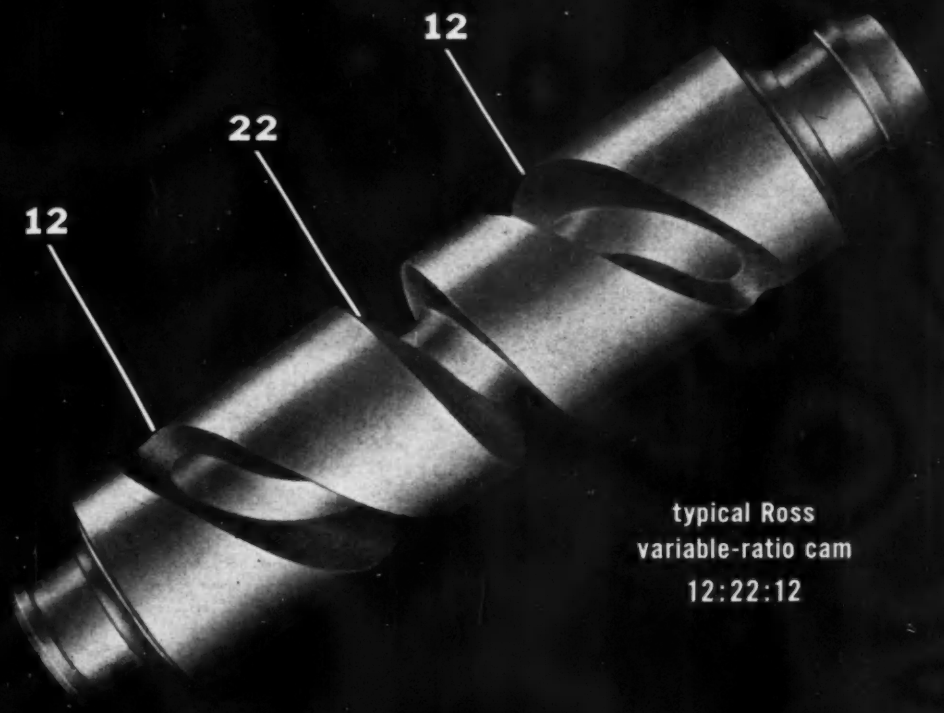
YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—
Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, Cleveland, San Francisco, Torrance and E. Orange, N. J.

MAHON

Circle 117 on Inquiry Card for more data

Engine fast? Steering slow?



Gear your handling to your go

Let your steering be nimble, alert, responsive . . . with *fewer* wheel turns. Ross *variable-ratio* steering gives faster steering and quicker recovery for cornering and slower steering and greater stability for straight-ahead handling.

Ross variable-ratio steering has been proved in service by 31 of today's leading vehicle manufacturers. Ross invites *your* inquiry.

Ross STEERING

ROSS GEAR & TOOL COMPANY, INC.
Ross Division, Lafayette, Indiana • Gemmer Division, Detroit, Michigan

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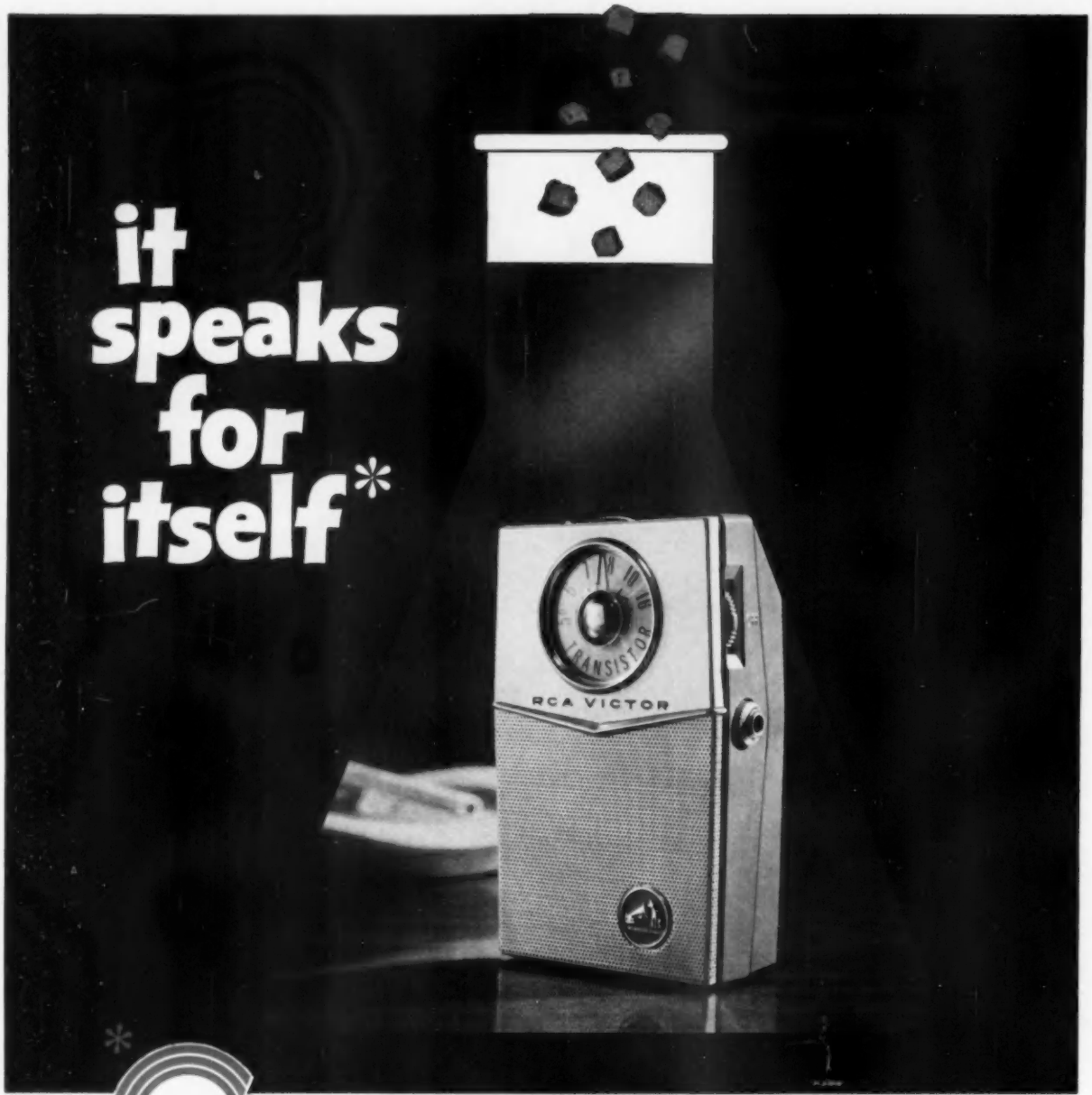

MOLDER: Santay Corporation, Chicago, Ill.

CYCOLAC® BRAND

TOUGH, HARD, RIGID POLYMERS FROM BORG-WARNER

Compact, colorful and cordless, this all-transistor radio by RCA Victor is housed in a famous Impac* case that gives rugged service; won't chip, crack or break in normal use. To achieve this dramatic durability, RCA Victor engineers specified cases molded of CYCOLAC brand ABS polymers for their complete line of transistor models. Light and smooth, this most versatile of all rigid plastics defies staining from chemicals and acids and retains its molded-in color for the lifetime of the radio. Easily formed into any intricate shape, CYCOLAC brand plastic lends beauty, protection and saleability to any product . . . radios, television, telephones. See why CYCOLAC is better in more ways than any other plastic. Write Dept. C-9.

MARBON CHEMICAL DIVISION **BORG-WARNER**

WASHINGTON WEST VIRGINIA

*CYCOLAC is the registered trademark of Borg-Warner
*IMPAC is the registered trademark of Radio Corporation of America.

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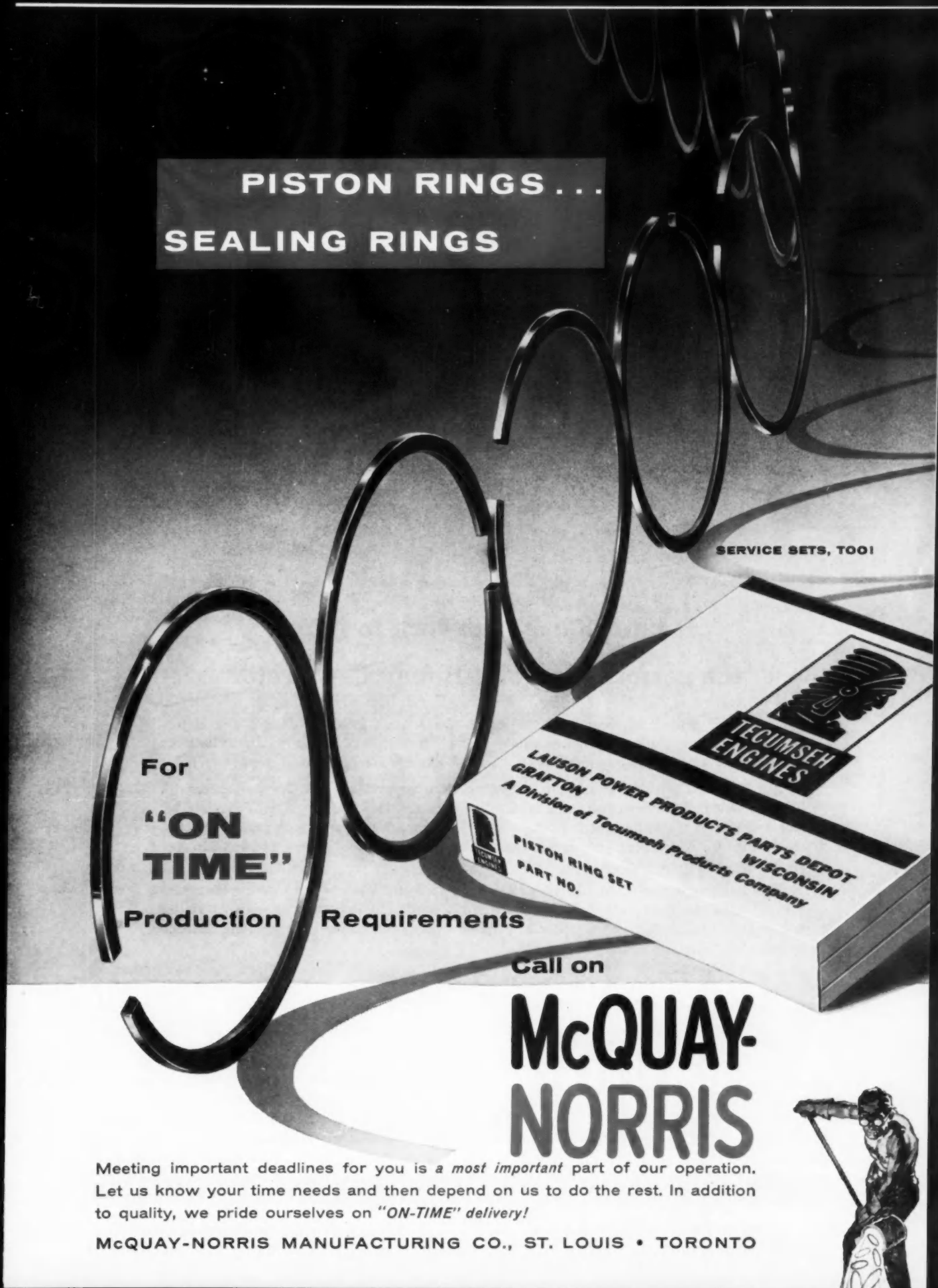
Circle 120 on Inquiry Card for more data →



Meeting important deadlines for you is *a most important* part of our operation. Let us know your time needs and then depend on us to do the rest. In addition to quality, we pride ourselves on *"ON-TIME" delivery!*

McQUAY-NORRIS MANUFACTURING CO., ST. LOUIS • TORONTO

It takes fancy footwork to prove the performance of a Holley Carburetor

Headwork by skilled development engineers is the starting point in designing a Holley Carburetor to meet the exact requirements of a precision-built engine. Painstaking *Handwork* in building the development model to rigid specifications is another critical step.

But *Footwork* puts the final stamp of performance approval on a Holley Carburetor . . . fancy footwork on Holley's test track to simulate the many antics of the average driver. This footwork checks the carburetor's efficiency on tight turns, assures that it won't gasp or protest on inclines up to 30 per cent, demonstrates that it will provide smooth acceleration and maximum economy under all conditions.

It is this pre-proved performance, backed by more than 55 years of experience, that gives car and truck manufacturers such confidence in Holley. It's an important reason why Holley will continue to be a major supplier of *original equipment* carburetors and ignition components for America's leading cars and trucks.

OVER 55 YEARS · ORIGINAL EQUIPMENT MANUFACTURERS

HOLLEY Carburetor Co.

RESEARCHERS AND DEVELOPERS
IN THREE OF AMERICA'S
MOST IMPORTANT INDUSTRIES

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Circle 121 on Inquiry Card for more data

Gasket engineering

GASKET SEALS VS. FLANGE FINISH

Smooth flanges usually help simplify gasket problems . . . but they raise machining costs. Can a gasket material compensate so well for flange roughness that machining costs can be reduced?

E. M. SMOLEY
Research Physicist
Armstrong Research and Development Center

How smooth do flange surfaces in gasketed assemblies have to be? Is there a gasket that will seal so efficiently that less machining of flange surfaces might be practical?

To answer these questions, extensive tests were conducted at the Armstrong Research and Development Center, using rough (3000 micro-inch) and smooth (5 micro-inch) flange finishes.

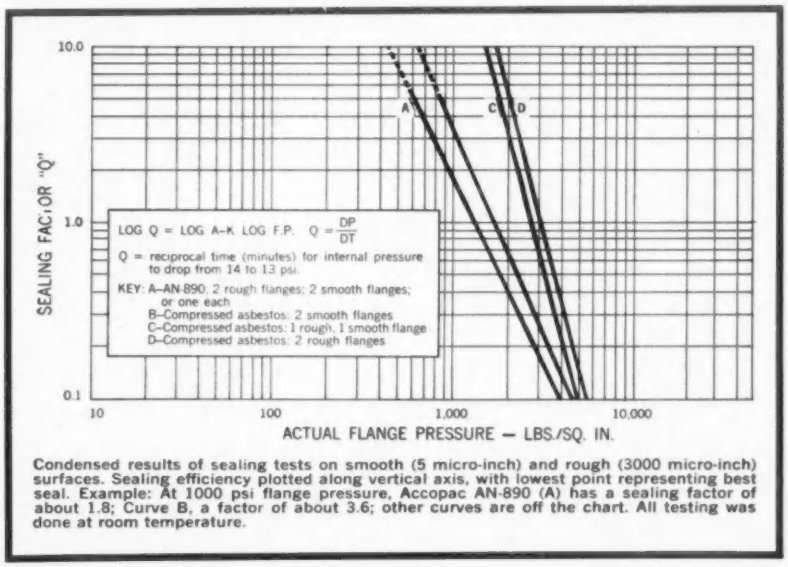
Two different gasket materials were compared: one, a standard grade of compressed asbestos; the other, Armstrong Accopac AN-890, a beater-saturated rubber-asbestos material. Both were 1/32″ gauge.

In each test, air was locked in gasketed flange assemblies at an internal pressure of 14 psi. Then pressure loss was measured and recorded as a function of time by the electro-mechanical air leakage tester developed by Armstrong engineers.

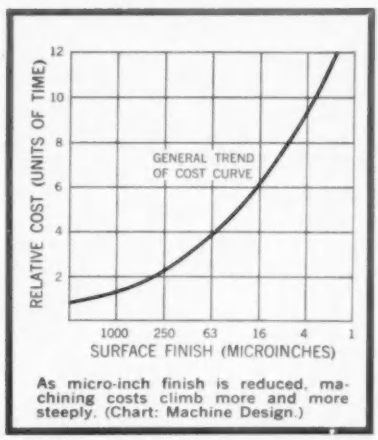
Many individual tests were run, using two smooth flanges, two rough flanges, or one of each. The results are condensed on the chart below.

The curves show that AN-890 Accopac has far better sealability with either rough or smooth flanges—or one of each—than the compressed asbestos material. Even at the relatively low flange pressure of 1000 psi, the unusual sealing ability of AN-890 is evident.

The superior performance of AN-890 is a result of the way it's made. The patented beater-saturation process gives a more uniform dispersion of rubber on fiber—hence, AN-890 is a more compressible material. As a result, it has unusual conformability to flange irregularities.



Condensed results of sealing tests on smooth (5 micro-inch) and rough (3000 micro-inch) surfaces. Sealing efficiency plotted along vertical axis, with lowest point representing best seal. Example: At 1000 psi flange pressure, Accopac AN-890 (A) has a sealing factor of about 1.8; Curve B, a factor of about 3.6; other curves are off the chart. All testing was done at room temperature.

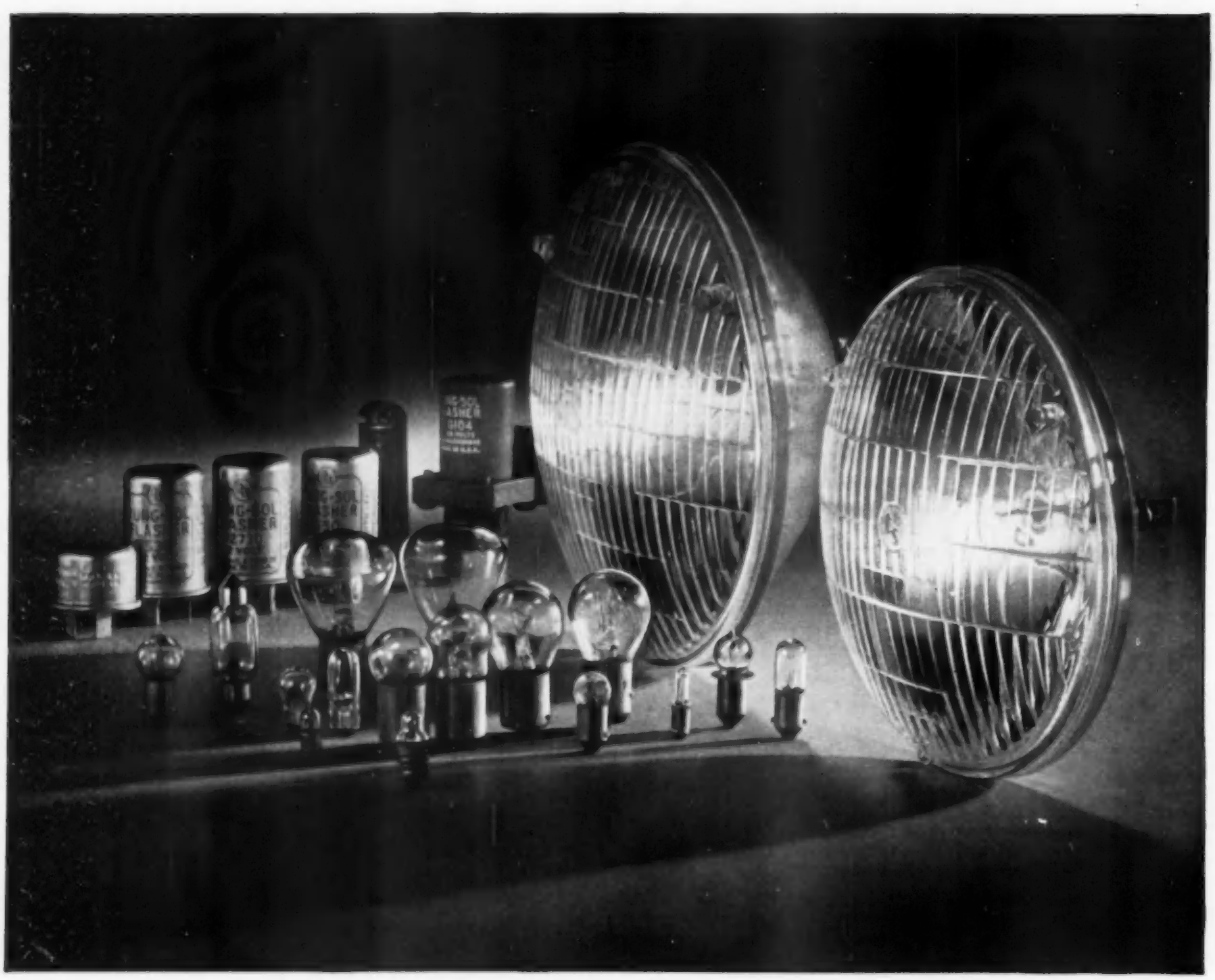


As micro-inch finish is reduced, machining costs climb more and more steeply. (Chart: Machine Design.)

These tests indicate that Accopac AN-890 offers definite promise of efficient seals at higher micro-inch flange finishes. Its use can make possible savings in machining costs that are well worth considering.

Research on gasket performance is a continuing project at the Armstrong Research and Development Center. Our large library of data may already contain the answers to your specific sealing problems. We will be glad to make suggestions if you will send details to us. Address Armstrong Cork Company, 7109 Imperial Ave., Lancaster, Pennsylvania.

Tung-Sol has achieved remarkable results in meeting the ever higher quality demands of the automobile industry while lowering the cost of Tung-Sol products



TUNG-SOL®

TUNG-SOL ELECTRIC INC., NEWARK 4, N. J./TWX: NK193

HEADLAMPS • MINIATURE LAMPS • FLASHERS

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HOW MANY WAYS CAN *Special Purpose Fasteners* CUT COSTS FOR YOU?

How many of your products employ laborious, old-fashioned fastening methods where simple fasteners could do the job and cut costs, too? How many parts and sub-assemblies can be adapted to include a self-fastening feature? How many future products could be improved by advance planning for fastener efficiency?

United-Carr's engineering staff offers you a wealth of experience in the design of special-purpose fasteners and self-fastening devices. Large-scale manufacturing facilities (including in-plant plastics molding equipment) ensure economical, *volume* production and prompt deliveries. United-Carr field representatives are ready to call on you at *your* request.

The names DOT, TEENUTS, TRIMOUNT are registered trade-marks of United-Carr Fastener Corporation

POLYETHYLENE MOUNTING FOOT

No mar, no scratch glide for use on TV receivers, record changers, small appliances, etc. Assembles into round hole in wood or metal cabinets.

NYLON SNAP-IN NUT

Snaps into square hole stamped out of sheet metal . . . provides secure anchorage for any sheet metal or self-tapping screw . . . highly effective electrical insulator.

QUICKEY FASTENER

Eliminates need for welding or swaging studs to sheet metal stampings, facilitates nesting, eliminates damage in transit because Quickey snaps in before final assembly.

6-PRONG TEENUT

Offers greatly increased push-out resistance; virtually eliminates the problem of lost fasteners, cuts rejections, customer complaints, etc. Claw-like prongs toe in for maximum gripping power.

PLUG BUTTONS

Snap into ⅛" to 3" dia. holes. Can be embossed with ornamental or functional designs . . . various finishes, shapes and sizes.

WIRING FASTENER

Mounting legs snap into round hole . . . provide secure anchorage. Body of fastener holds wires without chafing.

MOLDING FASTENER

Ideal for use with thread cutting fasteners or available with threaded stud for nut and lock washer assembly. Spring leg maintains tension to keep fastener blade locked in molding channels.

TEENUT

One-piece, all-metal nut has welding bosses on upper or lower surface of mounting flange. Has high tensile strength and provides secure, permanent anchorage for bolt. Available in various shapes and sizes.

TRIMOUNT STUDS

Hold two or more thicknesses of material together. Easily installed by hand. Insure vibration proof attachment. Permanent or removable. Many shapes and sizes.

DURABLE DOT FASTENER

Snap fastener for cloth, leather, plastics and other materials. Positive closure, instant release. Black, nickel or brass finish.

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Division of United-Carr Fastener Corporation, Cambridge 42, Mass.

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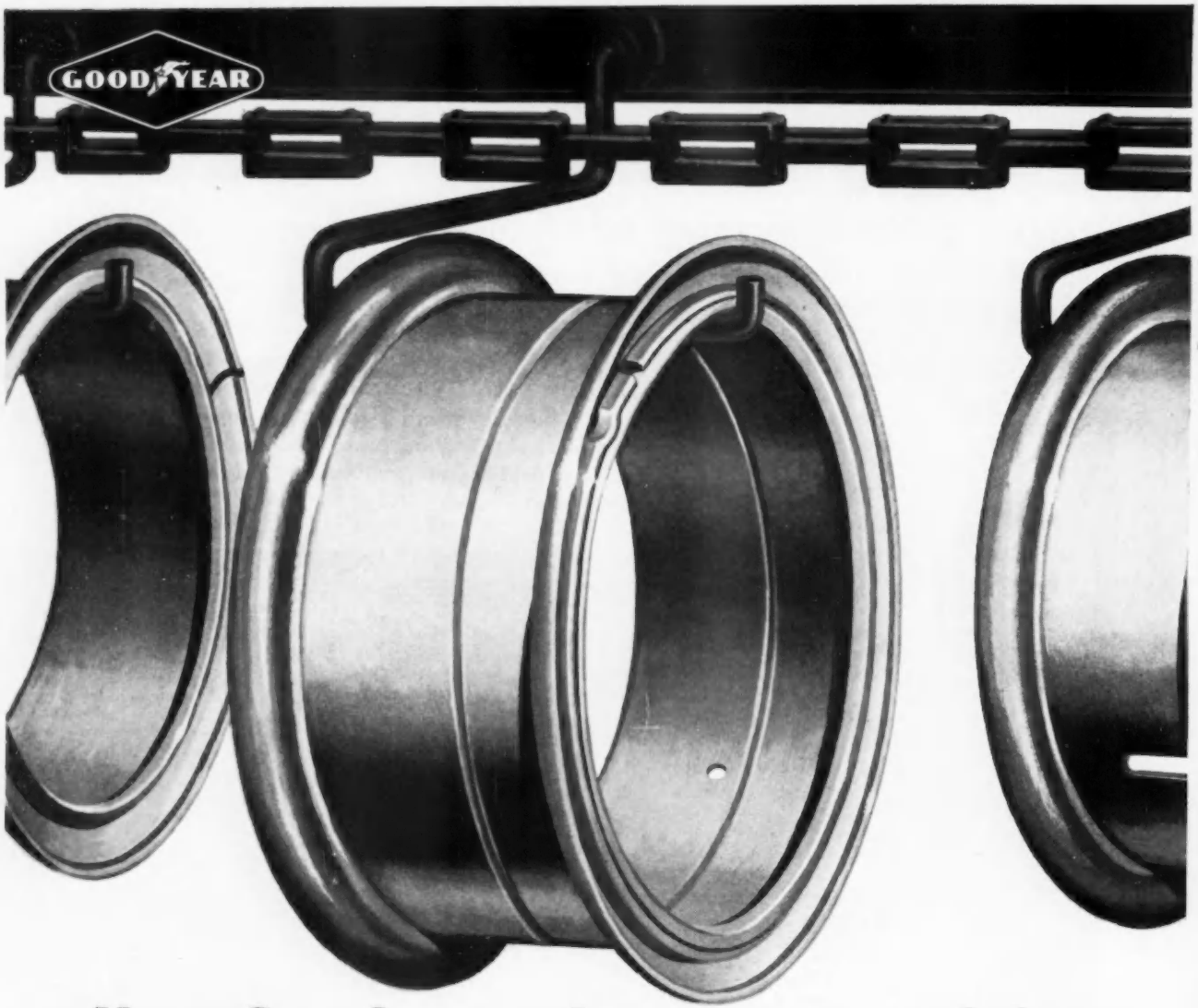


Now Goodyear rims are precision-

These new Goodyear precision rims, for over-the-road use, are built to such close tolerances they better industry standards by *a full fifty per cent.*

What's more, Lateral and Radial Runout will not exceed 1/32 of an inch.

For *equipment manufacturers* this means a complete line of over-the-road rims to match the most accurately made wheels for use on their equipment.

For *fleet owners and operators* the immediate benefits are longer tire mileage, less down

Lots of good things come from GOOD

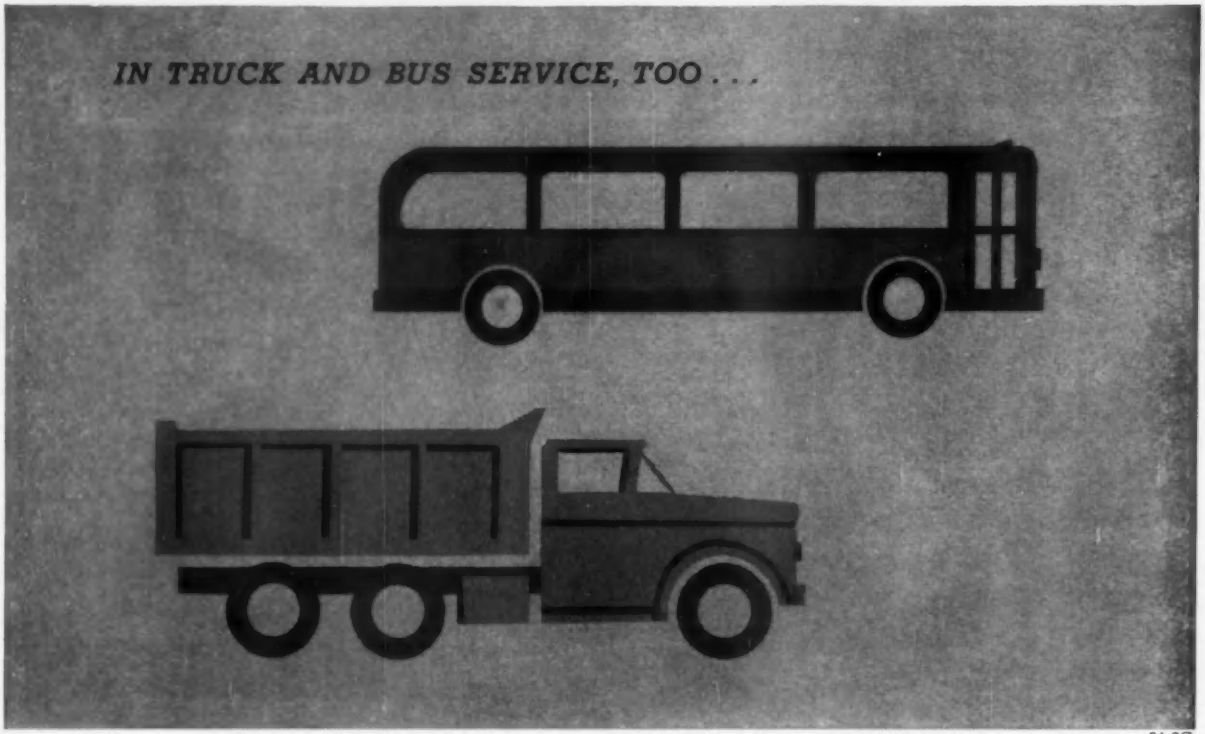
built to run 50% truer

time and a lower cost-per-mile operation. Vibration is markedly reduced and so is driver fatigue.

Whether you're a manufacturer or the owner of one truck or of an entire fleet of trucks, it will pay you to specify these revolutionary new rims. For additional information on what they can do to improve operating efficiency and lower your costs, write Goodyear, Metal Products Division, Akron 16, Ohio. Or, if you prefer, get in touch with your local Goodyear Rim Distributor.

YEAR

More tons are carried on Goodyear rims than on any other kind

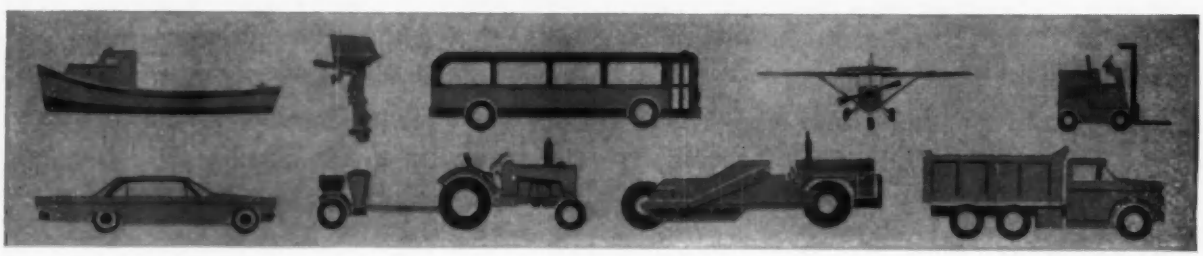


61-2C

special tools weed out the little squirts

Matching diesel engine fuel injectors for top efficiency and fuel economy took too many hours and too much guesswork . . . until Kent-Moore developed the first injector comparator for field service use. Now the job's a breeze . . . and no more little squirts!

Doing things the *right* way . . . in the right time . . . is a special knack of special service tools. By cutting service costs and equipment downtime, they build future sales for you. Just one more reason so many manufacturers (of boats and buses, cars and cranes, trucks and tractors, planes and plows, and on and on) are bringing their *special* service problems to Kent-Moore Organization. K-M works with your service engineering staff to design and build the just-right special tools for you. Call and see for yourself.



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What's News in Rubber...

Enjay Butyl smooths the bounce out of bumps!

For built-in shock absorption and damping, Enjay Butyl has proved to be outstanding in product after product. The illustration above shows why. Unlike ordinary rubber (red ball) which shows extended bounce when dropped, Enjay Butyl (blue ball) absorbs shock with almost no bounce at all! Results—in automobile engine mounts and axle bumpers – greater shock absorption for smoother rides; in tires – road-hugging performance, quieter, safer stops and no squeal even on sharpest curves.

In addition, Enjay Butyl offers many other outstanding properties such as impermeability to gases and resistance to chemicals, heat, weather, ozone and aging. In addition to Butyl, there is new Butyl Latex and Butyl HT-10-66 (halogenated for high heat resistance and faster cures). In rubber, plastics, chemicals and oil additives, chances are that Enjay has the product to solve your problem. Write to us at 15 West 51st Street, New York 19, N. Y.

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ENJAY CHEMICAL COMPANY

A DIVISION OF HUMBLE OIL & REFINING COMPANY

ENJAY

"Paper phenolic sandwiches" seal the contents of automotive condensers. CDF mass-produces insulating caps, using a paper phenolic laminate core of high dielectric strength and mechanical rigidity carefully bonded between two layers of rubber. High speed machines punch out the caps to close tolerances.

Result: For the automotive industry, a large volume source of reliable, economical insulating caps . . . one of the many quality products manufactured by CDF.

CDF CONTINENTAL-DIAMOND FIBRE

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NEWS

Vol. 125, No. 6 September 15, 1961

2d Best Year Predicted

Romney and Cole Expect 7 Million Sales

By James Dunne, Detroit Regional Editor, and C. B. Campbell, News Editor

If 1962 lives up to expectations, the automobile industry will have a banner year with sales exceeded only by record-breaking 1955.

The latest predictions of auto officials at new car previews set the '62 total at or above a healthy seven million total.

George Romney, president of American Motors, looks for seven million in '62. Edward N. Cole, Chevrolet general manager, thinks the automotive market could run as high as 7,250,000 cars and 1,150,000 trucks. His General Motors associate, S. E. Knudsen, general manager of Pontiac Div., also sees a 7.25 million market.

400,000 Imports Expected

All estimates included approximately 400,000 imports. And Sherwood H. Egbert, Studebaker-Packard president, although not quoting any figures, indicated he expected a greatly enlarged volume next year.

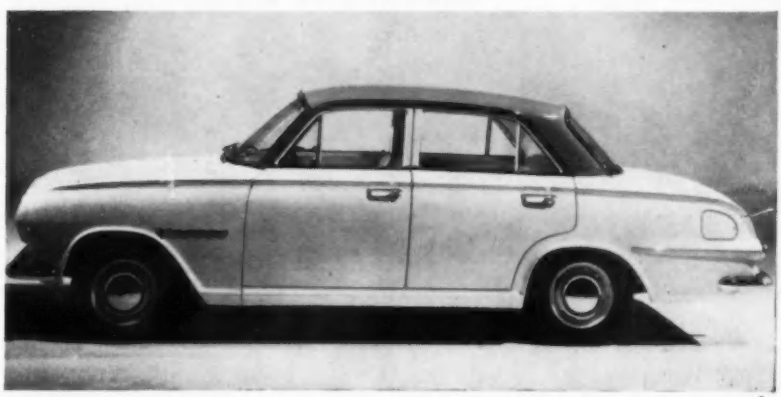
Mr. Cole also predicted a record 1.9 million cars and 400,000 trucks in '62 for Chevrolet Div. This 2.3 million total would mark a new sales high for the industry, exceeding the record established in 1955 when Chevrolet sold 2,066,337 cars and trucks.

Mr. Cole made an interesting point when the 1.9 million total was broken down into affected market potential of the Chevrolet, Chevy II and Corvair. Chevrolet believes it will sell 200,000 Corvairs in '62. That is a one-third drop from the projected 300,000 this year.

Mr. Cole explained there were two reasons for this estimate. First, the Chevy II will be the big volume seller in the compact field, taking some sales from Corvair. Secondly, more Monza type models will be stressed to sell "personalized transportation."

To support this decision to glamorize the Corvair, Mr. Cole pointed out that the Monza is now accounting for a whopping 56 per cent of Corvair sales. A Monza station

VAUXHALL VICTOR LARGER, LOWER



Made by General Motors in Britain, the 1962 model has brand-new integral body. Power of the 92 cu in. engine has been increased to 56.3 hp at 4600 rpm. Weight is saved by use of aluminum intake manifold, timing-gear case, clutch housing, gearbox rear cover, and water and oil pump housings. Chassis components have only four grease points—on the front suspension ball joints—and need lubrication at only 12,000-mi intervals.

wagon will be marketed this month to further increase this percentage.

Mr. Cole added that it is no secret that Chevrolet is going to have a Corvair convertible. It will be announced in March.

Pontiac Div. expects to sell 500,000 units in '62, according to Mr. Knudsen. This is the same number Mr. Romney expects for American Motors. This sales goal represents a 30 per cent increase over the 385,000 cars American Motors expects to sell this year.

Highlights of New Cars

The big news at Chevrolet is the all-new Chevy II series. It has a 110-in. wheelbase with both four and six-cylinder in-line engines offered.

Larger than the Corvair, the Chevy II line has nine models on five body shells. There are two and four-door sedans, two and three-seat station wagons, a convertible and hardtop sports coupe.

The models are in three series —100, 300 and the Nova 400—the luxury series.

Both automatic and standard transmissions are available on the new models which have unit body construction and conventional front engine-rear drive design.

DEERE SALES UP 19 PCT.

Deere & Co. has reported a 19 percent increase in sales in the United States and Canada for the first nine months of the 1961 fiscal year.

Sales through July 31 totaled $403.7 million, compared with $339 million a year ago.

Earnings also were substantially higher than a year ago. Net income for the first nine months was $23.8 million compared with $9.1 million last year. The 1960 income figure was depressed by costs of changing over to a new line of farm tractors. Net income per share of common stock was $3.46 this year and $1.33 last year.

However, nothing is conventional about the rear suspension, which utilizes single, tapered plate rear springs. This is the first in production automobile design.

The six-cylinder, 194 cu in. engine is rated at 120 hp. The 53 cu in. four-cylinder engine develops 90 hp.

A new, 327 cu in. V-8 is being offered on the standard Chevrolet as well as the Corvette. It replaces the 348 cu in. engine except for use in heavy trucks. The 327 new engine develops 250 hp and is 87 lbs lighter than its predecessor.

In the truck field, Chevrolet will market the 327 cu in. engine and a new, 408 cu in. gasoline engine. They will develop 185 and 252 hp respectively. Chevrolet also will enter the Diesel market with a four-cylinder, 212 cu in. Diesel developing 130 hp.

Studebakers Longer

Studebaker cars are up to 13 in. longer for '62. The Lark line will have 19 models, including a sports coupe and convertible called the Daytona. Cruiser, De luxe and Regal models also will be offered.

All four-door sedans are built on 133-in. wheelbase, up from the 109 in. on the two-door sedans.

The Hawk has been extensively restyled and bears a striking resemblance to the Thunderbird.

A double safety brake arrangement, with separate hydraulic systems for front and rear brakes is offered as standard equipment on all Ramblers. If the front brakes should fail, the rear brakes will operate, and vice versa.

Chassis lubrication for Classics and Ambassadors has been increased to 33,000 mi.

A new E-stick transmission is offered on the American. The transmission shifts in the normal manual-shift pattern, but there is no clutch pedal. The clutch is operated hydraulically by limit switches and the engine oil pump.

A 30 per cent reduction in the number of models has been made. This brings the total number of Ramblers from 41 to 29.

LATEST MODEL OF TRIUMPH TR4

British sports car has larger body and engine. Four-cylinder unit is bored out to 130 cu in. displacements and develops 100 hp at 4600 rpm. Gearbox has synchromesh on all four speeds. Other features are rack and pinion steering and adjustable steering column that telescopes on impact.

Falcon for '62 Boasts 3 New Models And Many Improvements to Engines

The 1962 Falcon continues its distinctive styling and economy features with some interesting changes in eye appeal. In addition to new ornamentation Falcon has new front fenders; a full width aluminum grille of modified convex shape; and a chromium-plated, simulated air scoop on the hood. The wheelbase remains at 109.5 in.

Falcon boasts the addition of three new models: Falcon Squire (a four-door, simulated wood panel station wagon), a Station Bus, and Club Wagon. There are two and four-door sedans; two and four-door station wagons; four-door Squire; two-door Futura; Station Bus, and Club Wagon.

The same 144 cu in and 170 cu in. sixes are offered with manual transmission. The 170 cu in. engine is optional on all models and standard on the Club Wagon. Manual choke is standard.

The engines are precision-cast with light section walls to produce light weight cast iron power plants.

Engine improvements include a torsional vibration damper that provides greater smoothness and freedom from vibration. The fuel filter has extended life, serving for 30,000 mi. before replacement. An independent fuel pump is standard and does not incorporate a vacuum pump since the windshield wipers are electrically operated.

1962 Falcon Squire Station Wagon

Electrical equipment is all new and includes a high-mounted trailing brush generator with a rubber shield to keep out road splash and dirt. A new starter has a sealed housing. The new carburetor provides improved automatic choke operation. The new air cleaner has a one-bolt mounting.

Among other mechanical highlights is a unique engine mounting. At the rear there is a cantilever spring mount connected to the rear of the transmission and attached to the floor pan cross member. It is said to do an excellent job of isolating noise and vibration.

Prevents Accidental Shifting

The manual shift transmission now incorporates a safety interlock mechanism which prevents accidental shifting into low or reverse. Clutch operation is further improved by introduction of a Delrin bushing in the linkage which eliminates lubrication.

Some detail changes also have been made in the suspension system. These include a heavier front stabilizer strut and bracket; addition of a rubber insulating pad above each front coil spring, and heavier rear shock absorber bracket.

The brake system includes new wheel cylinders with a restriction orifice for softer operation and a honing operation on the brake drums. Parking brake conduits are nylon lined to provide a self-lubricating friction-free surface for the cable. It reduces brake effort and improves the release action. It also is claimed that nylon lined cable is less sensitive to freezing.

NEWS

CONTINUED

New Lincoln Continental Has Lifetime Transmission, Rear Axle Lubrication

The luxurious Lincoln Continental has gained significant headway in customer acceptance through its reliability program. In styling, specifications, and powerplant, the 1962 model is without major change. It has, however, many refinements. Mounted on a 123-in. wheelbase, it is available in a four-door sedan and four-door convertible.

Although the suspension system remains the same in design concept, the ride has been further improved through generous use of thicker rubber bushings in chassis components. Wheel alignment is expected to stay put indefinitely as a result of a self-positioning shimless caster and camber adjustment feature.

6000 Mi. Engine Lubrication

To keep the car on the road without service station hoist stops, engine lubrication is good for 6000 mi., and so is the full flow oil filter. Chassis lubrication is good for 30,000 mi.; transmission and rear axle lubrication are untouched for the life of the car.

On the engine, the most significant improvement is a water-heated control for the automatic choke. In cold weather the heated water prevents the choke from operating when the engine is stopped for short periods.

Engine durability is enhanced by a select fit program for main and connecting rod bearings, tappet bores, and intake and exhaust valves. Intake valves are made of Silchrome I material and have shot-peened stems.

The camshaft sprocket for the timing chain drive is an aluminum die casting with the tooth surface made of nylon. This is said to make for quiet, trouble-free service and improves the chain life materially.

A thermostatically-controlled return fuel line added to the fuel pump, recirculates unused fuel, aids in cooling the pump, and prevents vapor lock. A closed crankcase ventilation system is standard.

Corrosion Resistance

Plating has been employed extensively to resist corrosion. This applies to the carburetor linkage and on the hydraulic valve lifters which have chromium-plated plungers and a hardened steel outer body.

Rear shock absorbers have been increased in size and have an improved constant viscosity hydraulic fluid on sedan models. Both front and rear shocks are fitted with rebound cut-off control, make it feasible to eliminate rubber rebound bumpers.

Rear springs have wax-impregnated fabric liners to minimize inter-leaf friction. The iso-clamp rubber mounting of rear springs to the axle prevents transfer of noise.

Brakes have been given special attention to reduce fading and increase lining life. The cast iron brake drums on sedans are flared for improved cooling. After rough machining they are annealed to relieve internal stresses. They are given two finish cuts, balanced, machined again, then given a two-directional honing tratment. Front drums of convertible models are of flared aluminum with cast iron inserts. Brakes are self-adjusting and feature a new fade-resistant lining said to have double the life of conventional lining.

Further protection for the brake system is found in the chromium plating of brake shoe ledges; nylon lined parking brake conduits, and anodized wheel cylinder pistons.

Housed in Nylon Tube

The new speedometer cable assembly is housed in a nylon tube which is enclosed by a wire-wound shield and vinyl sheathing and is lubricated for life.

The hydraulic windshield wiper system has been both simplified and improved by making the regulator valve integral with the hydraulic motor. This eliminates last year's outside plumbing lines.

Lincoln Continental Has Many Engineering Refinements

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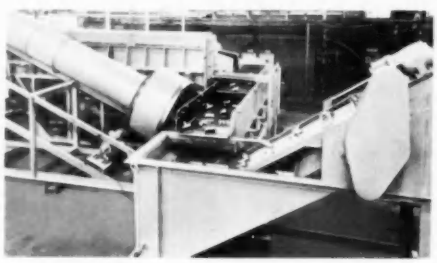

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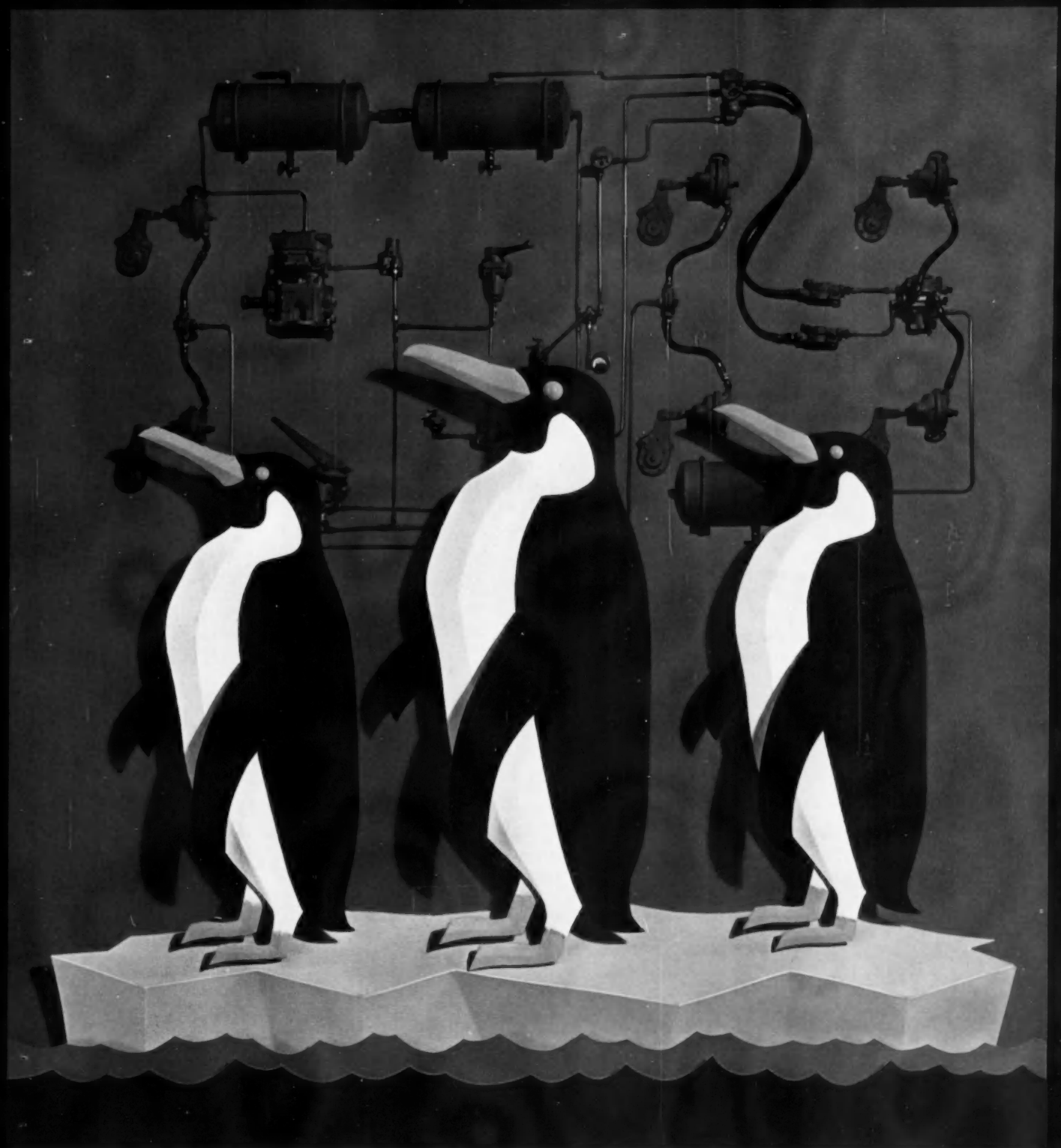

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- 4 strategically located air brake plants

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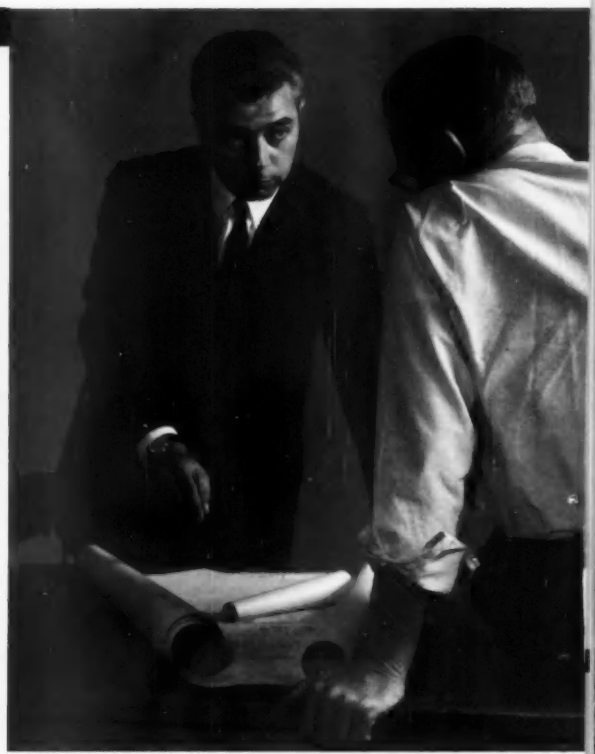

Bendix-Westinghouse service-sales representatives work directly with fleet operators, vehicle manufacturers, distributors, and dealers in serving the trucking industry's needs.

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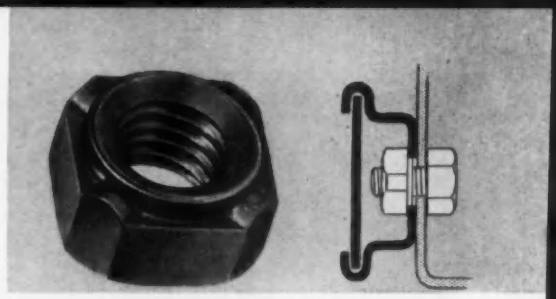

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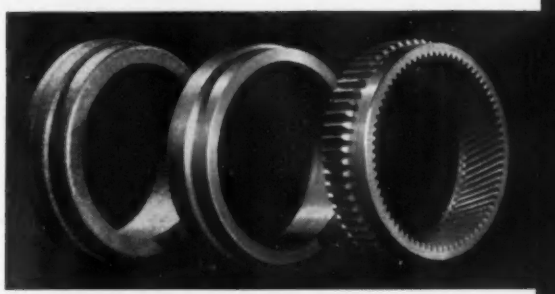

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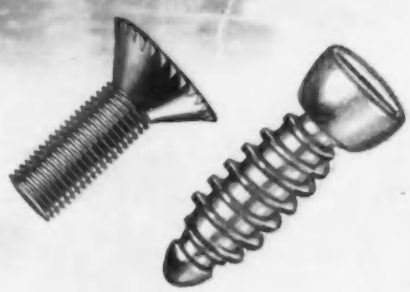

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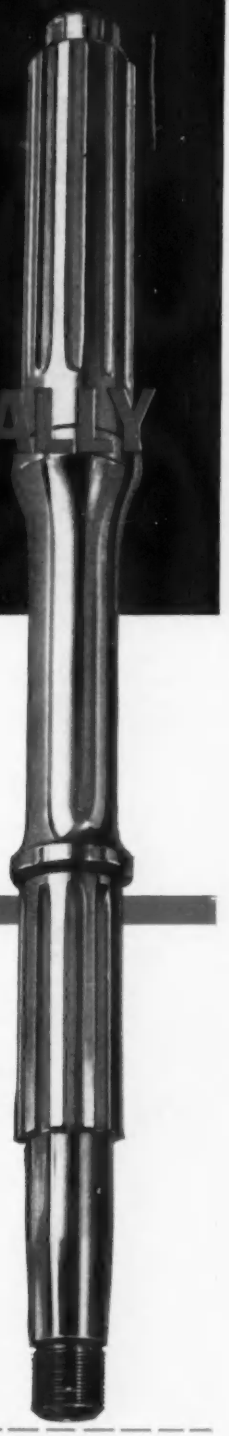
INCREASES PRODUCTION SUBSTANTIALLY — doubles tool life



Increases turning production 20%

Increases drill life 50%

Eliminates heat treating

Here's an example of how a small additional investment in material enabled Rockwell-Standard to increase production and cut cost on an axle for farm equipment.

Part: Axle for a self-propelled harvester.

Steel: FATIGUE-PROOF steel bars . . . replacing HR resulphurized A-4140.

Result: Heat treating eliminated. More uniform hardness across the section (302 Brinell) including small diameters. Hand straightening eliminated. Shaft runout in turning, reduced from an average of .015″ to .005″ in turning. Lower cost per part.

PRODUCTION INCREASES

Turning Operations: Speed increased approximately 45%. Tool life increased from 12 to 25 pieces per tip . . . tungsten carbide tips were used.

Drilling Operations: Drill life increased approximately 50% with FATIGUE-PROOF.

Milling Keyway: Entire lot of 550 pieces were run on one cutter . . . cutter formerly required sharpening after 300 pieces.

Hobbing Operations: Production increased approximately 60% . . . from 26 pieces per hour to 44.2 pieces per hour. Hob life doubled.

FATIGUE-PROOF steel bars offer all these cost cutting advantages.

No heat treating necessary—no quench cracks, warpage or other heat treating problems. Costly operations eliminated.

Exceptional Uniformity—from surface to center, end to end, bar to bar, size to size, and lot to lot.

Faster Machining—faster than annealed alloys; 50% to 100% faster than heat treated alloys.

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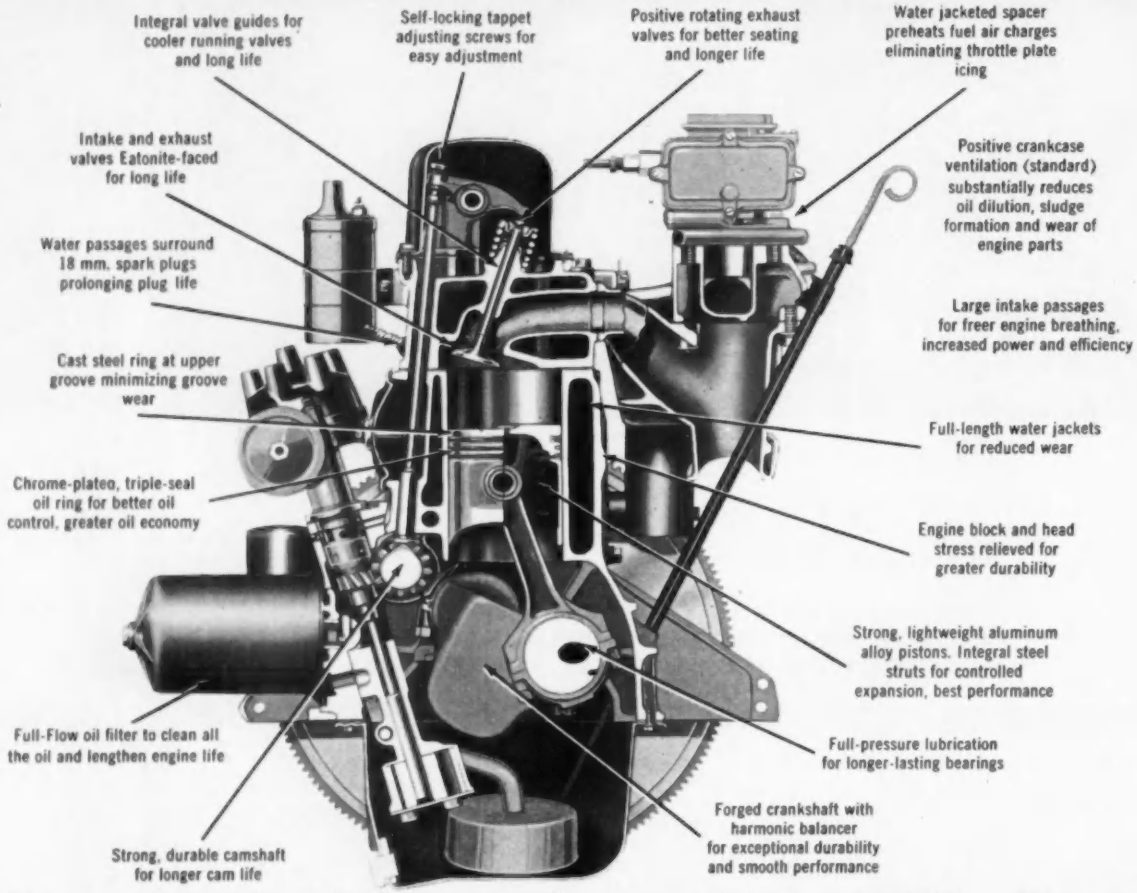
ALL-NEW 262 CUBIC INCH SIX JOINS FORD INDUSTRIAL ENGINE LINE



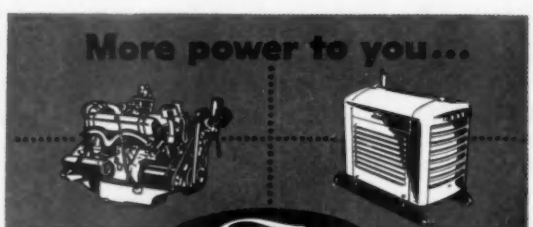
Now . . . more six-cylinder power for your job! The durability of heavy-duty construction—the gas economy of six-cylinder design—they're all yours in one engine, the all-new Ford Big Six!

Built to last with many heavy-duty features, the all-new Big Six teams dependable performance with durability and gas economy . . . advantages you'll find in *every* Ford engine!

All Ford engines are *compact*, overhead-valve design . . . delivering *more* horsepower per pound of engine weight *than ever before possible!*

Ford parts are as near to you as your Ford Dealer . . . and there's a nationwide network of Ford Industrial Products Dealers to provide you with fast, efficient service.

For help in choosing the *right* power for *your* job, write to the address shown below. You have 13 different engine displacements to choose from.



Ford
INDUSTRIAL ENGINES AND POWER UNITS

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.
FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

NEWS

FEATURES

Turbo-Charged Engine

Olds Uses Special Fluid Injection

Oldsmobile engineers claim a major technical breakthrough by bringing down to earth a key principle of high performance aircraft engine design. The result is an ultra-high performing Turbo-Rocket aluminum V - 8 engine scheduled for introduction on a limited production sports car early this winter.

Jack F. Wolfram, Oldsmobile Div. general manager and a General Motors vice president, said the Turbo-Rocket will mark the first successful application of a turbo-charger with fluid injection on a commercially - produced passenger car.

"Injection of a specially-formulated Turbo-Rocket fluid," he explained, "controls combustion by keeping a more uniform burning rate during combustion in each cylinder. This makes it possible to operate the turbo - charged engine at a highly-efficient 10.25:1 compression ratio, with readily available premium grade gasolines.

Economy and Performance

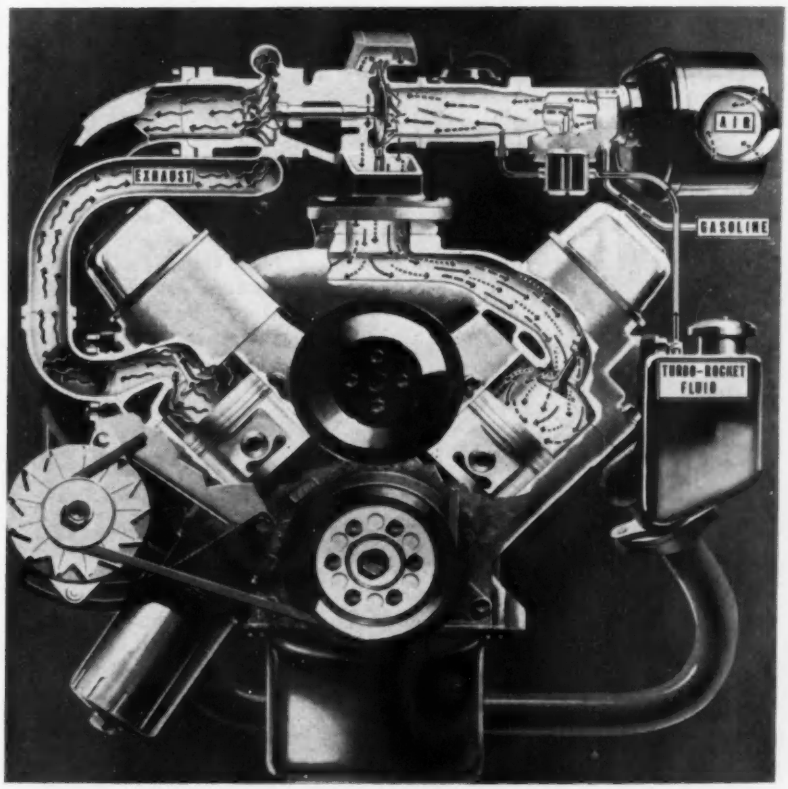
"This new fluid-injection turbo-charged engine delivers economy when it is wanted and sensational performance when the driver needs it. It is an exclusive Oldsmobile engineering development incorporating a turbo-charger made by the Air Research Div. of Garrett Corp., manufacturers of turbo-chargers for the aircraft industry.

"The Turbo-Rocket engine," he continued, "will produce approximately one horsepower for each of its 215 cu in of cylinder volume, approaching a long-standing production car design goal of automotive engineers. Its power-to-weight ratio also is extremely low at 1.88 lbs per horsepower."

Have Same Purpose

Both turbo-chargers and superchargers have the same purpose: to increase power output by pumping more air-fuel mixture through

(*Turn to page 53, please*)



Olds' Turbo-Rocket V-8 With Fluid Injection

TABLOID

Operator technique and plaster material differences are statistically insensitive in relation to the reproducibility of fused silica slip castings according to an Atomic Energy Commission report on materials for use in high-temperature radiation fields.

* * *

Rising demand in military and non-military applications for high-purity metals capable of withstanding high temperatures and possessing improved physical properties, is resulting in increased capacity for their production in vacuum melting and vacuum degassing facilities.

* * *

High-grade steel can be further strengthened by decreasing its sulfur content through innoculations of calcium under conditions of high slag basicity, according to an Army Ordnance Corps report.

* * *

A technique to determine in a single experiment the dynamic compressibility of a solid over a relatively large pressure range has been developed by the Navy. The method uses a rotating-mirror smear camera.

* * *

A new selective bibliography listing Government research reports, translations, and other technical documents on nickel metal, alloys, compounds, and catalysts has been published by the Office of Technical Services, Business and Defense Services Administration, U. S. Dept. of Commerce.

* * *

Boating enthusiasts are offered a new catamaran-type craft that deflates for portability, can be handled by one person, and is virtually impossible to sink or upset. The "Water Cat I" is 45 by 50 by 11 in. deflated and weighs only 55 lb. Inflated, the boat is 57 by 118 by 22 in. It has a tubular aluminum frame and molded glass fiber center section. A five-hp outboard motor develops speeds of eight to 10 mph.

The increasing demand for fluid power systems equipment for both military and non-military uses is expected to push the output of U. S. producers to approximately $600 million this year.

* * *

New brazing methods and materials developed to meet the challenge of heat-resistant metal components used in the aircraft and missile industries are compiled in a summary on high-temperature brazing.

* * *

The latest available design information and related characteristics of wrought titanium and its alloys used in aircraft and missile fabrication are assembled for industrial designers and metallurgists.

* * *

An easy-to-use lighting calculator designed for shipyard use, a portable electric oven for baking paint, and a mobile welding unit are described in a collection of machine shop practices recently adopted by the Navy's Bureau of Ships.

* * *

A method that makes it possible to use a digital computer to calculate the dynamic stability of supersonic aircraft has been developed by the Air Force. Another report lists the areodynamic characteristics of cone-cylinders in a steady-state spin.

* * *

Factors influencing the fracture characteristics of high-strength steel are examined in a research report. Another report concerns the application of high strength aluminum castings.

* * *

A new selective bibliography listing Government research reports, translations, and other technical documents on zirconium metals, alloys, and compounds has been published by the Office of Technical Services, Business and Defense Services Administration, U. S. Dept. of Commerce.

Charles W. Minkel (right), quality control inspector at Ford Motor Co.'s Buffalo, N. Y., stamping plant, receives awards totaling $15,313 for suggestions. Making presentation is K. D. Cassidy, vice president-industrial relations. Mr. Minkel has received $32,652 for suggestions, a Ford record.

Stevenson Optimistic

R. S. Stevenson, president, Allis-Chalmers Mfg. Co., said the second quarter of 1961 saw measurable improvement in several product lines. "Seasonably improved shipments of farm equipment continued well ahead of last year," Mr. Stevenson said. "Processing machinery orders for the mining and cement industries climbed to all-time highs."

Sales and other income totaled $260.1 million for the first six months of 1961, Allis-Chalmers Mfg. Co. reported. Sales for the same period last year were $284.5 million.

Earnings per share this year were 50 cents while last year they were 83 cents.

(*Continued from page* 51)
the engine for increased performance.

But in doing so, it has been the practice with superchargers to operate at relatively low, less economical compression ratios in order to control detonation.

"However," Mr. Wolfram explained, "a new high-compression-plus - turbo - charging concept by Oldsmobile engineers, coupled with their development of a practical system for injecting anti-detonant fluid, made our Turbo-Rocket engine a reality."

Air Force Contracts

The Air Force has announced award of eight contracts totaling $35.2 million.

Contracts included:

The Boeing Co., Wichita, Kan., $18.3 million for cyclic testing of B-52G and B-52H aircraft.

North American Aviation, Inc., Los Angeles, $1.8 million for acquisition and installation of facilities under the machine tool modernization and replacement program, and $7 million for design and development of guided air missiles and trainer kits. This award also includes funds for aircraft modification kits for F-100 aircraft and missile launcher assemblies.

General Electric Co., Philadelphia, $1.1 million for research and development of Samos II program.

Hughes Aircraft Co., Culver City, Calif., $1.5 million for shipping and storage cases for guided air rocket missiles.

B. F. Goodrich Co., Akron, O., $1.1 million for spare tires for F-105 aircraft.

Revolutionary Vehicle

Experiments will be started soon on a revolutionary vehicle, designed to travel on water, hard surfaces, snow, mud or tundra, as the result of a $20,000 contract awarded Chance Vought Corp., Dallas, Tex.

The projected vehicle would operate on a continuous track of rubber-impregnated cells filled with low pressure air, giving the vehicle high flotation capability and permitting it to ride over soft terrain or water. Probably resembling a tank, the machine would have self-cleaning tracks, with air blowing away mud, dust or snow.

The contract award for the vehicle, called PAT, for Plenum Air Track, provides for a preliminary investigation of the new concept in transportation. Plenum is an air supply chamber which can be furnished with air automatically if pressure is lost. The cells would be self-sealing if punctured.

Plans call for the PAT to travel about 10 mph on water and 50 mph on highways. The speed on water would be twice that of present amphibians.

Capable of being powered by a number of engine types, one version of PAT could carry eight men over terrain when conventional vehicles would bog down.

Steel Wire Tires

Tires with millions of tiny pieces of built-in steel wire hidden beneath the tread have been announced for mining, quarrying and road construction. The wire is contained in the undertread, a layer of rubber between the tread and the fabric body of a tire. This shredded wire undertread has been made a standard part of the larger sizes of off-the-road tires produced by the Goodyear Tire & Rubber Co.

The wire is .0058 in. in diameter and a 33.5-33 size tire would contain more than six million pieces of wire, weighing about 19 lb.

Revolutionary Military Vehicle

EUROPEAN ROUND-UP

By DAVID SCOTT • Special Correspondent

The Coventry Climax V-8 engine has made its first appearance in a Grand Prix race. The 90-degree, twin-overhead-cam unit of 90 cu in. displacement features a complex tuned exhaust system and the Lucas transistor ignition system.

The 1962 crop of British cars is coming on the market. Vauxhall has introduced a completely restyled Victor with a larger, lower body. A high-performance prestige version will follow. Standard-Triumph has brought out the TR.4, latest edition of its sports car series. Body is entirely new, and a larger 100-hp engine is used.

Jaguar will soon launch the successor to its Mark IX sedan. A coupe version of the Consul Classic 315 is expected from Ford, as are an Anglia station wagon and permutations on the Consul 375.

Britain's auto industry is slowly recouping its losses of the past slump year. Car production is now back to 85 per cent of the level a year ago, and further gradual gains are expected.

B.M.C. has nearly completed its $140 million expansion aimed at raising annual vehicle output to a million units. Its new truck factory at Bathgate, Scotland, has just started up.

Among component manufacturers, Borg-Warner has nearly finished an $11 million program that doubles the size of its automatic transmission plant at Letchworth, England. The project was financed by the parent American company.

Feroda has started work on a new factory in Wales for brake and clutch linings.

Fork Truck Patented

Lansing Bagnall has patented a fork truck design incorporating inter-axle walking plates that can extricate the vehicle when bogged down. A pair of underslung plates are driven eccentrically by crankpins that provide sufficient downward movement to lift the wheels, then rearward travel to inch the truck forward.

Saab in Sweden is using a rubber diaphragm to form complicated shapes in sheet metal in one operation on a standard press. The diaphragm is the upper die, and hydraulic pressure extends it to force the metal into the lower die cavities. A split lower die permits extraction of complex pressings.

A German company in Dusseldorf has originated a simplified method of degreasing metals prior to plating or phosphating. The organic washing solvent and the aqueous alkali are placed in the same tank. The heavier solvent sinks to the bottom, and the metal component is first suspended in this lower layer, then raised to the upper level where electrolysis can be applied if required.

A Stuttgart firm has devised a tread band for dual wheels that fits around the two tires to increase traction on ice or soft ground. The openwork rubber tread is formed in a lattice of durable synthetic material which is centrally positioned by a between-tire bulge and retained by wire beads.

Girling has devised a hold mechanism for air-sprung vehicles that prevents body sag during loading when the engine and air compressor are not running. A double-faced ratchet-toothed bar on the axle is engaged by a pair of opposed spring-loaded pawls on the body. Pawls are retracted by solenoids when the ignition is switched on, permitting free movement of the vertical bar.

The West German industry continues to boom, and output has climbed nearly 10 per cent during the last six months. Daimler-Benz aims to increase production of Mercedes cars to 145,000 by the end of this year, and 155,000 by 1962.

Renault Machine Tools

French output has declined but Renault's machine tool division is thriving. Following big orders from Russia's truck and tractor industry, it has now sold an automatic transfer line for cylinder blocks to Czechoslovakia for use in the Skoda car factory. It also sees prospects in India's $117 million foreign-currency plan to develop a local vehicle industry.

Other Asian countries are linking up with European auto companies. Thailand's first assembly plant, producing English Fords exclusively, has started up in Bangkok. In Japan, NSU has signed a licensing agreement with two firms in Osaka and Hiroshima covering manufacture of the Wankel engine.

Army's Light Planes

Cessna Aircraft Co. has received an Army contract for the production of 70 L-19 Bird Dog liaison and observation airplanes.

Production will start early next spring at Cessna's plant in Wichita, Kan., with first deliveries scheduled for June, 1962. The contract extends through May, 1963.

The new airplanes will be L-19E models, the latest in the Bird Dog series.

The L-19E, powered by a 213-hp continental engine, has a maximum sea level speed of 115 mph and a range of more than 500 mi.

Signals Pace Traffic

A new traffic signal system, designed to increase intersection traffic-load by 20 per cent has been installed on a four-mile stretch of roadway running past the General Motors Technical Center in Warren, Mich.

Called the Traffic Pacer, the system is the first installation of its kind in America. It was developed by GM Research Laboratories in cooperation with the Macomb County Road Commission.

The installation is designed to move vehicles in orderly, uninterrupted runs through its entire length, indicating to drivers the speed to travel in order to reach intersections on the green light.

This is done with a series of illuminated speed advisory signals hanging over the highway. These are numerals 20 in. high resembling football or baseball scoreboard numbers. A motorist entering the four-mile system at either end or from any intersection in between needs only obey these speed signals of from 25 to 45 mph.

Additional traffic signals, called pre-signal lights, are located some 300-800 ft. ahead of an intersection. The purpose of the pre-signals is to stop out-of-phase traffic before it reaches an intersection where the light is red. The pre-signal turns green in time to permit cars to enter an intersection without stopping.

The system is modeled to some extent after so-called "traffic funnels" used extensively in Germany to improve both road capacity and traffic safety through elimination of most intersection stops.

SIKORSKY'S HIGH SPEED HELICOPTER

Artist's drawing shows high performance helicopter proposed in design study submitted by Sikorsky Aircraft Div. of United Aircraft Corp. to the Army Transportation Research Command. Twin-turbine craft would have speeds up to 224 mph, payloads as high as 7000 lb and a ferry range of 2400 mi.

B-W Gets Navy Award

Borg-Warner Corp. has received a $3.2 million Navy award to produce spur gear drive assemblies for Marine Corps amphibian tanks.

Generator Contract

Dresser Industries, Inc., has announced that its Clark Bros. Div has received a $1.6 million contract from the Navy for the design and construction of four special gas turbine generators.

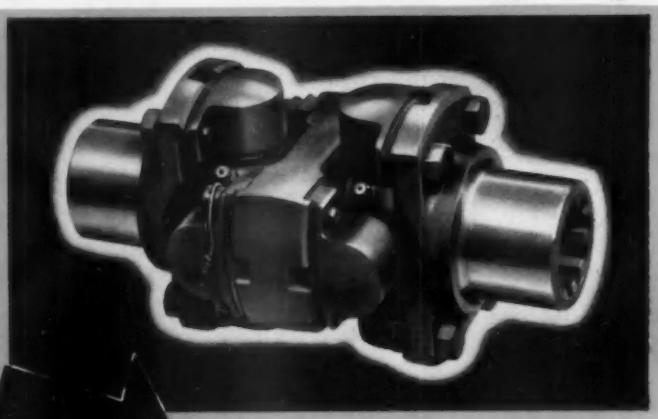
Air Force Contracts

Northrop Corp. has been awarded a $62.3 million Air Force contract for production of T-38 planes and equipment. They will be produced at the Hawthorne, Calif., plant.

The Air Force also gave Grumman Aircraft Engineering Corp. a $9 million contract for modification of SA-16 amphibians. They are used for crash and rescue missions.

MECHANICS

JOINTS MEAN QUALITY FOR YOU



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MECHANICS B-W UNIVERSAL JOINT BORG-WARNER

MEN IN THE NEWS

C. M. Hall Lamp Co.—Robert F. Meyers has been appointed vice president.

Ford Motor Co., Lincoln - Mercury Div. — Chase Morsey, Jr., has been promoted to assistant general manager.

Hupp Corp.—Robert J. Higley has been named assistant treasurer.

B. F. Goodrich Co. —L. T. Greiner has been promoted to assistant to the president in charge of customer relations.

Chrysler Corp.— Hayward F. York has been promoted to manager of manufacturing engineering.

Chrysler Corp.—Thomas A. Ostby (far left) has been appointed director of market planning and F. E. Cogsdill has been promoted to directing of marketing services.

Beech Aircraft Corp., Boulder Div. —**Howard E. Mers** has been promoted to manager-contract administration.

Motec Industries, Inc.—**William B. Mac Kay** has been named director of manufacturing engineering.

Aeroquip Corp. — **Don T. McKone, Jr.**, has been promoted to executive vice president.

Clark Equipment Co.—**George Plaut** has been named manager, industrial relations.

Electric Autolite Co.—**Paul F. Allmendinger** has been appointed director of engineering, electrical products group.

Reduction and Refining Co., Inc.— **A. R. Gaus** has been named executive vice president.

Ohio Crankshaft Co. — **Richard S. Sheetz** has been appointed executive vice president.

Ford Motor Co., International Staff —**William J. Quinn** has been appointed industrial relations manager.

J. I. Case Co.—**Morris W. Reid** has been promoted to marketing director.

Eaton Axles, Ltd.—**Robert K. Nelson** has been appointed technical director.

Walker Mfg. Co.—**A. B. McKee** has been named manager of filter sales.

Checker Motors Corp. — **John J. Love** has been named special projects representative.

Allis Chalmers Mfg. Co., Research Div.—**Dane T. Scag** has been promoted to assistant research director.

Borg-Warner Corp., Mechanics Universal Joint Div.—**Claude W. Mason** has been appointed vice president and assistant general manager and **Frank J. Hoyne** has been named vice president-sales.

Willys Motors, Inc.—**A. C. Sampietro** has been named chief engineer.

Chrysler Corp., Missile Div. — **Dr. Grant S. Bennett** has been appointed chief scientist-acoustics.

General Motors Corp., Oldsmobile Div.—**Thomas E. Darnton** has been appointed director of reliability.

Hughes Aircraft Co.—**James K. Cox** has been promoted to manager of Advanced Development Dept., Ground Systems Group.

Dana Corp.—**C. C. Dybvig** has been promoted to vice president-marketing.

Chrysler Corp., Chrysler Motors Corp.—**William S. Venn** has been named vice president.

Chicago Pneumatic Tool Co.—**Russell B. Miller** has been promoted to general sales manager.

Wesson Corp. — **Robert W. Berry, Jr.**, has been promoted to chief engineer.

Borg-Warner Corp., Borg & Beck Div.—**Stanley B. Kurzina, Jr.**, has been named works manager.

Studebaker-Packard Corp. — **Robert E. White** has been named government procurement coordinator.

General Motors Corp., Defense Systems Div.—**Dr. Arnold T. Nordsieck** has been named head of the Technical Specialties Dept.

Necrology

Charles C. Gates, 83, president of the Gates Rubber Co., died Aug. 29 in Denver, Colo.

Leslie E. Roberts, 54, former board chairman of the Seagrave Corp., died Aug. 27 in New York City.

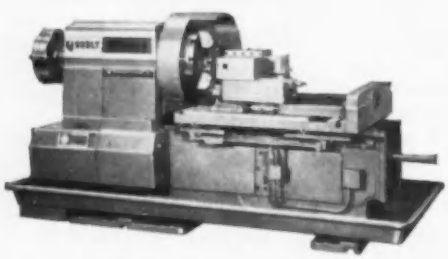
Gordon R. Cornwell, 61, assistant general auditor of Ford Motor Co., died Aug. 22 in Fergus Falls, Mich.

Lyal W. Montgomery, 66, a vice president and a director of the Racine Foundry & Manufacturing Co. and formerly secretary and treasurer of Frederick B. Stevens, Inc., died Aug. 19 in La Jolla, Calif.

Samuel Fitzpatrick, 75, former salesmanager for Studebaker Corp. and Federal Motor Trucks, died Aug. 15 in Detroit.

Ernest W. Burland, 61, superintendent of standards for the Chevrolet forge division, died Aug. 12 in Detroit.

SOMEBODY *is doing it for* LESS



MASTERLINE® SIMPLIMATIC Automatic Chucking Lathe—Here's the essence of the "building block" principle: standard headstock and wide, screw-fed platen; standard front, center, rear or auxiliary slides with tool blocks—positioned to handle maximum surfaces per chucking. Literally, there's no end to *your* opportunities for saving.

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If you have special machining jobs, you, too, may be in line for some substantial savings.

With recent developments in Gisholt Automatic Chuckers, many so-called "special" jobs are no longer being done on special machines.

Don't *you* buy that "special" before you investigate the Gisholt Simplimatic.® You may save money and precious lead time with the flexibility this standard lathe offers.

If your jobs include rings, discs, flywheels, sheaves, bevel gears, motor frames or housings, you, too, can do it for less.

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Circle 131 on Inquiry Card for more data

an Editorial

The 1962 Look —Coming Up

SOON THE 1962 MODEL CARS WILL BE PRESENTED to the public without the benefit of a national auto show. The offerings will be made at a most appropriate time. Consumers have more buying power than they had at this same time last year. The showings will be well in advance of the year-end Christmas buying season, even for the most forward-looking buyers. An unusually large amount of color, style, glamour and even sensational newness is apparent in virtually every new line. The national economy is well started on a strong up-turn. The general business outlook has become optimistic. Taken altogether, these aspects justify the prediction of a year of more than 7,000,000 car sales for 1962.

BUT THE NEW MODELS REPRESENT MUCH MORE than merely an excellent outlook and forecast of improved business and economic conditions. They reflect a newness and vigor characteristic of the best that the industry can offer. New engines, transmissions, car interiors, exterior trim and innovations in color and finish reflect marked advances in engineering as well as styling and design. Dealers are anxious to push sales aggressively and the sales outlook at retail levels promises to set a pace which will send production to new peak levels before the new year arrives.

POSSIBLY THIS IS A GOOD TIME to look back and review some of the dismal failures of economic forecasters who predicted unusually low sales for 1961. Some of the economists who are most widely quoted rendered a disservice to themselves and the industry by predicting 1961 output at as low a level as only 4,000,000 cars early in year. Belatedly they have revised their estimates. We wonder if the lesson of 1961 might prove that many economists not directly employed within the industry have few of the skills which enable them to predict output properly. Possibly they could help the country more if they would use more of the industry's own thinking in making their computations. At least, let's hope they do this for 1962.

Hartley W Barclay

Editor and Publisher

WHEN MOTOR OIL FLOWS THROUGH THIS NEW FRAM "WEAR-GUARD" OIL FILTER

UP TO 40% MORE ENGINE-KILLING SLUDGE IS TRAPPED!

Tests using radioactive tracer techniques proved it! An exclusive scientific breakthrough in the construction of new Fram "Wear-Guard" Oil Filters traps up to 40% more sludge than any other filter tested. No wonder in 1961 more auto manufacturers choose Fram to supply original equipment filters than any other filters. May we serve you? Fram Corporation, Providence 16, R.I.

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"WEAR-GUARD"® FILTERS

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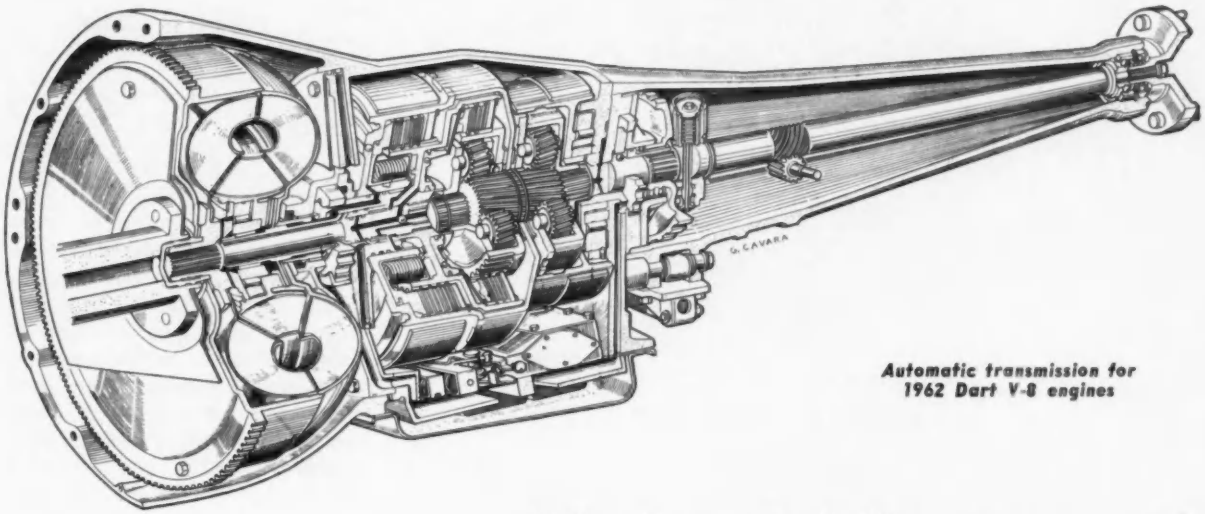


Automatic transmission for 1962 Dart V-8 engines

Mechanical Features of Chrysler Corporation's New Cars

By Joseph Geschelin
DETROIT EDITOR

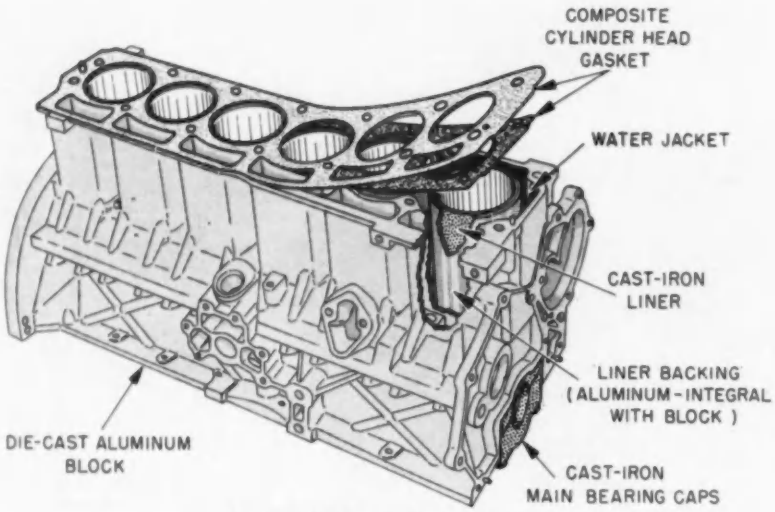
CHRYSLER Corporation had a lot to show for 1962 at its preview early this month. What we like about this preview is that for a number of years in succession the entire presentation has been "on the record." In fact, this summary of major mechanical changes and improvements is based upon authorized advance material.

The entire family is replete with sheet metal and styling and decorative changes to identify the new models. In the usual shifting of lines, Chrysler has introduced a new sports type car—the 300—priced midway between the Newport and New Yorker models. Dodge has introduced the Grand Turismo in the Lancer line; and a Polara 500—luxury sports model—in the Dart line. Plymouth has added the Valiant Signet 200.

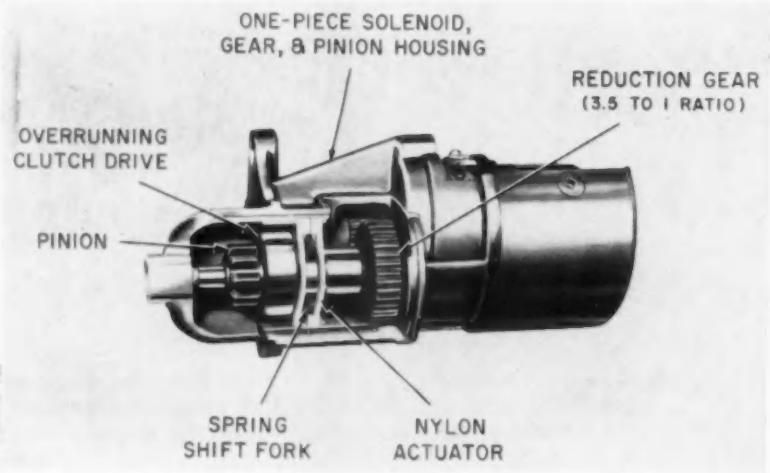
The Imperial is continued as a car with a massive separate chassis frame, the only one in the family that does not have unitized construction. Imperial production is located at the Chrysler East Jefferson plant where it is mixed with Chrysler models on the same assembly and paint lines. This procedure was described in AUTOMOTIVE INDUSTRIES, July 1, 1961.

One noteworthy feature is the formal introduction of the six-cylinder 225-cu in. aluminum engine with die-cast aluminum block weighing 45 lb less than the standard cast iron engine. It is available as an option only on Valiant and Lancer models. The block has integrally-cast dry liners, cast iron upper and lower main bearing caps. A special composite type head gasket is employed. It will be recalled that this engine was in limited production last year but its details were not released for publication until production experience made it feasible to offer it as a regular option.

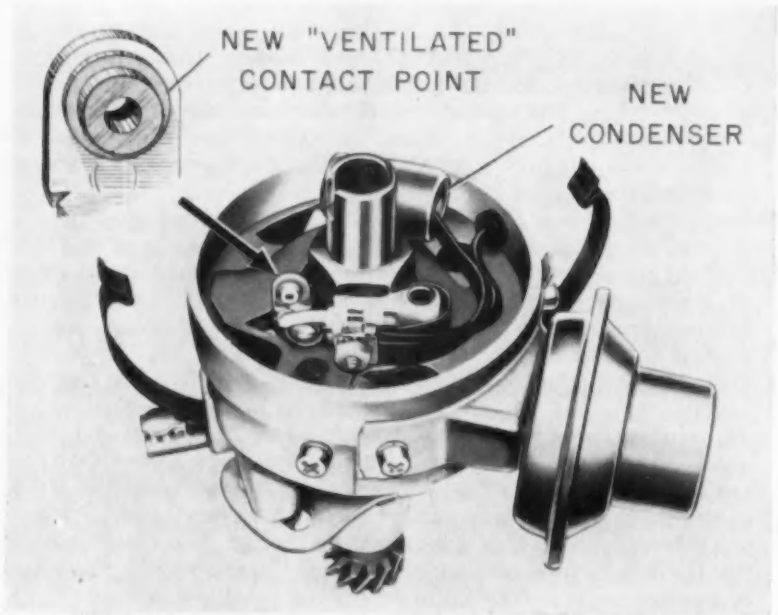
Objective of this brief summary is to cover some of the engineer-



Dodge aluminum cylinder block



Reduction gear starting motor



Improved distributor components. Note the ventilated contact point

ing features that are common, in principle at least, on all cars.

Lube-Free Chassis

First of all, the lube-free chassis has been extended to all models, the life of the factory lubricant being 32,000 miles. Incident to this, the tie-rod ends are lubricated for life, and electrical components are made lube-free.

Improved Electrical System

Sweeping improvements have been effected across the board in the electrical system. First is a new distributor with die-cast housing and ventilated breaker points. The breaker arm is nylon. Next is a unique starting motor with a built-in reduction gear. It is more compact and lighter in weight, quieter operating, and has greater torque output at low temperatures. Motor, gears, and solenoid shifting mechanism are encased in a die-cast aluminum housing. Another feature is a bulkhead wiring harness connector for the electrical wiring inside the passenger compartment, with added fuses housed in a single box.

Aluminum Steering Housing

All cars, except Chryslers and Imperials, have a new manual steering gear of recirculating ball-nut type, cased in a die-cast aluminum housing. It connects with the steering shaft by means of a new universal coupling. A column-mounted gearshift lever has been adopted. It features a concentric shift mechanism free from external shift rods.

Revised Brake System

All cars, except Chryslers and Imperials, employ a revised brake system—characterized as of servo-contact type with automatic self-adjusting feature. The parking brake, too, is different on these cars. It has been removed from the transmission end and is now connected to the rear brakes. All cars feature a vacuum-suspended power brake system which does not require a reservoir tank.

New Automatic Transmission

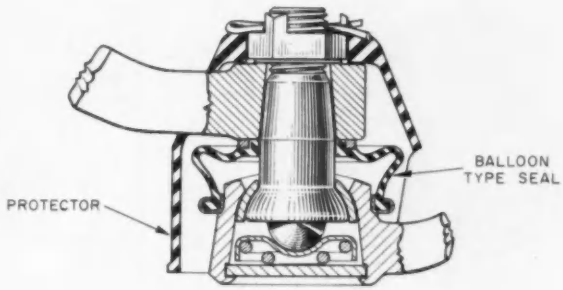
All cars, except the Valiant and Lancer models, boast a new automatic transmission that replaced

TorqueFlite on V-8's. It is more compact, lighter, and reduces the front tunnel materially. Control functions, gear ratios, and push-button control, however, are similar to TorqueFlite. An 11¾-in. diameter torque converter is employed across the board for all V-8's, being connected to the crankshaft flange by means of a flexible drive plate. The front pump now is driven directly by the impeller hub.

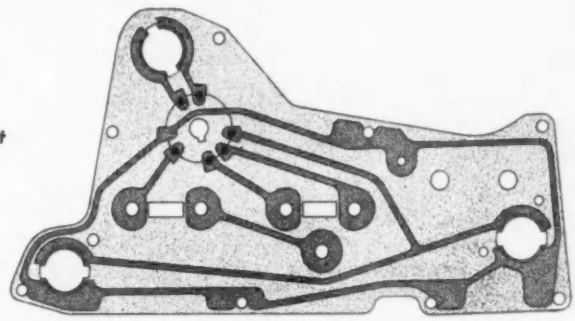
One of the major features of the V-8 automatic transmission is the provision of a parking sprag controlled from the instrument panel. Note, however, that the transmission supplied for Chryslers and Imperials differs in this detail; it does not incorporate a sprag mechanism since the parking brake remains on the transmission end.

The transmission case is a one-piece aluminum die-casting, as is the extension housing.

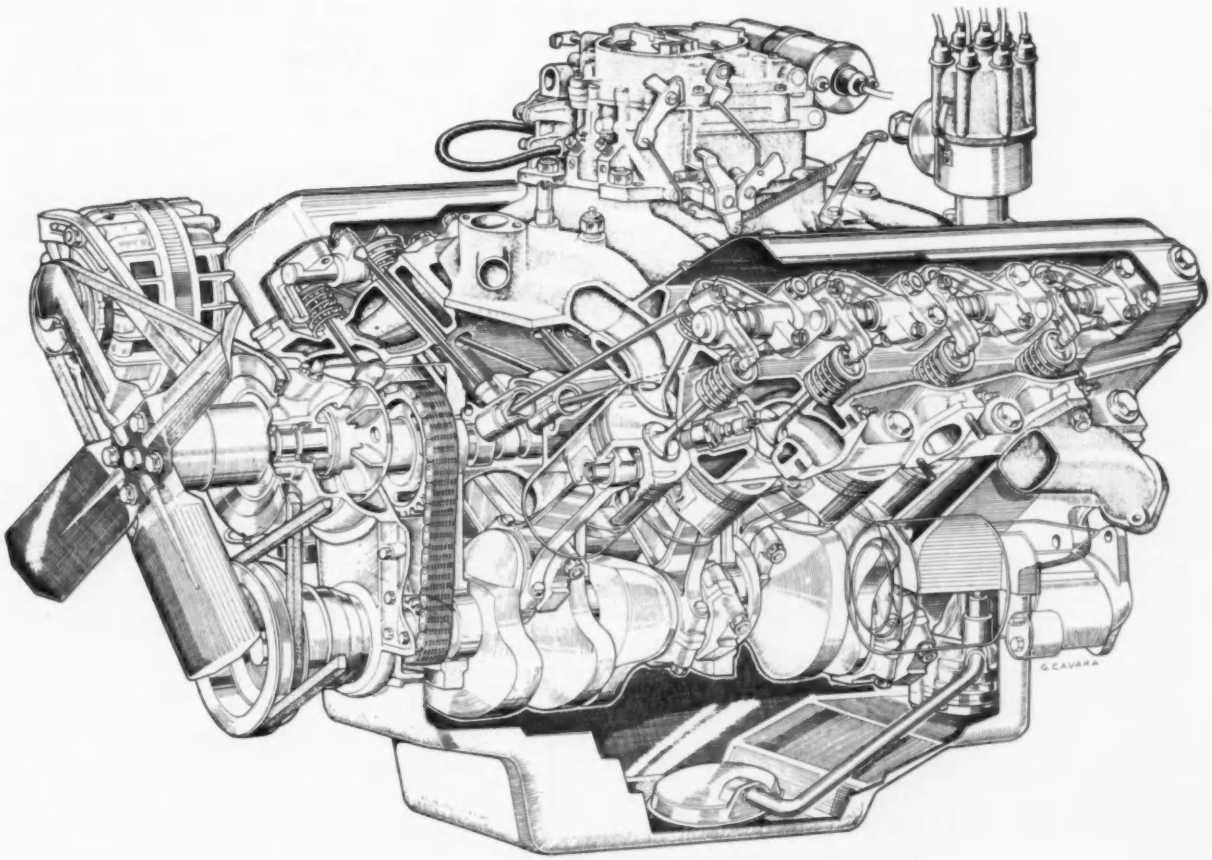
Tires on both Valiant and Lancer



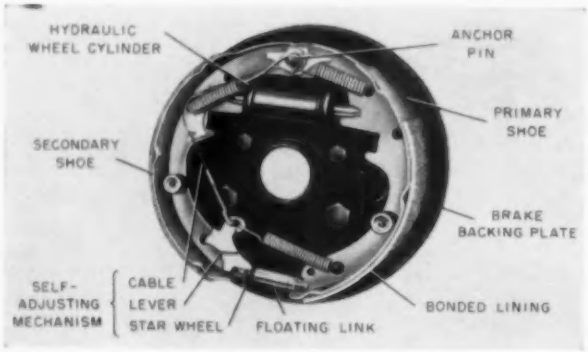
A typical lube-sealed chassis ball-joint fitting on 1962 cars



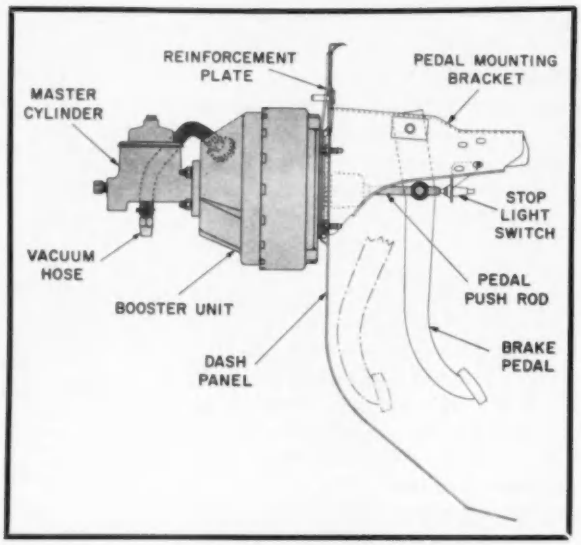
Printed instrument panel circuit



The 318-cu in. Dart V-8 engine

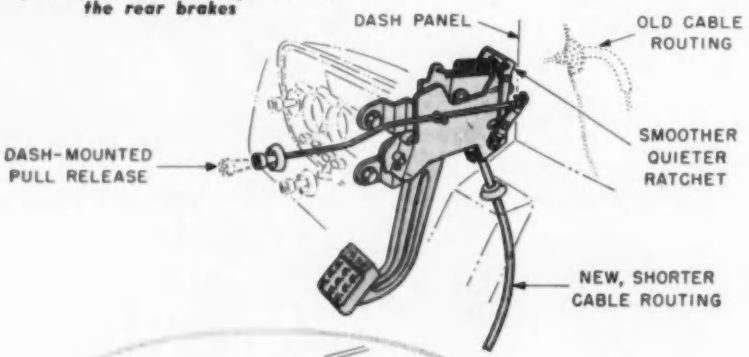


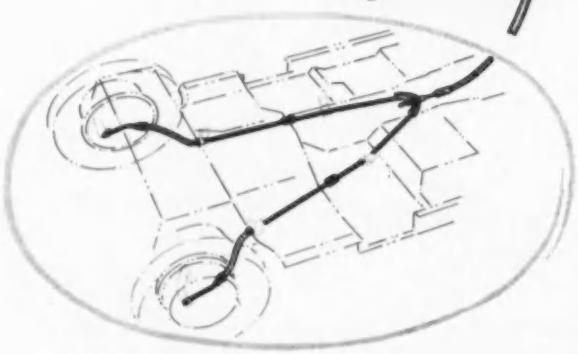
Dodge Servo-Contact brake



This view is typical of the new vacuum-suspended power brake system as well as the method of mounting on the firewall

All Chrysler Corp. cars, except Chrysler series and Imperials, have revised parking brake systems, eliminating the transmission-mounted brake. As shown, the parking brake now operates on the rear brakes

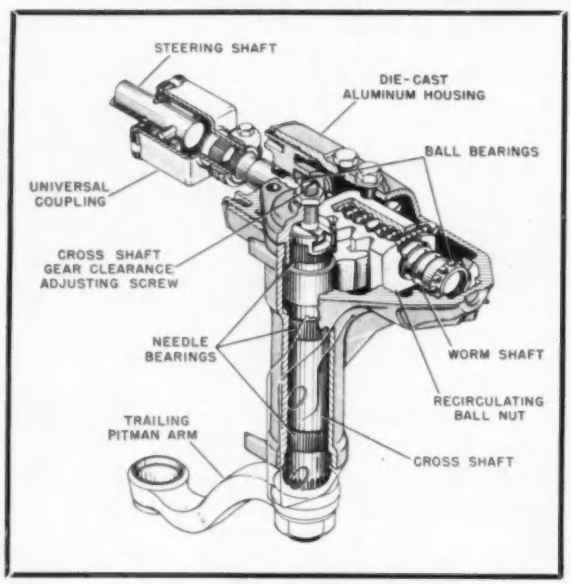


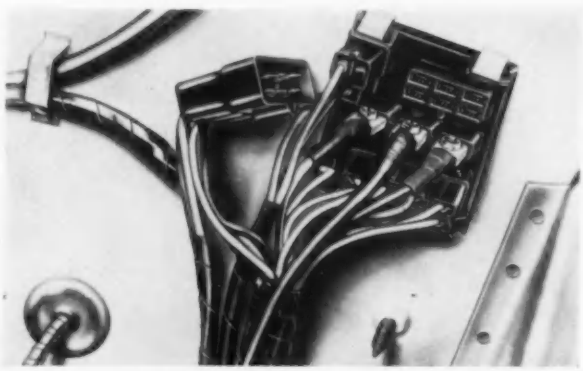


series are 6.50 x 13-in. and are of two-ply construction.

Basic engines remain the same as last year (see AI, September 15, 1960, and March 15, 1961). However, there have been some changes in utilization and in design detail. Such differences will be described in connection with individual descriptions of the cars, to be found in this issue of AI. ■

This is typical of the recirculating ball-nut type manual steering gear found on Chrysler products. Note the die-cast aluminum housing and the special joint connecting the gear to the steering shaft

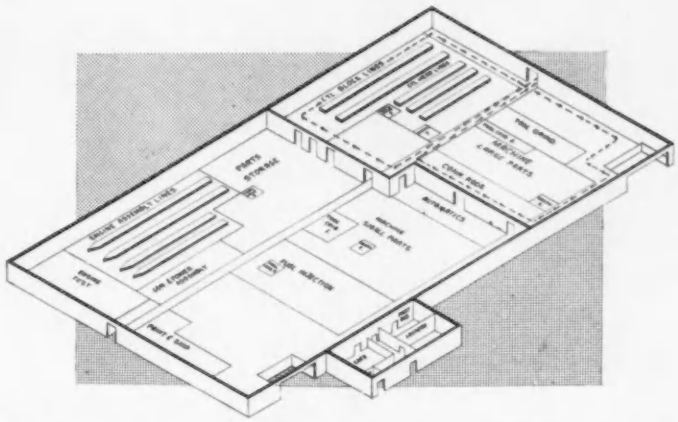




Bulkhead wiring connector used on Dodge Dart and Lancer series

New Allis-Chalmers Engine Plant

PART I



Schematic layout of the floor plan of the new Allis-Chalmers engine plant. Note that a third cylinder block line is being added in the area at the upper right hand corner.

By Joseph Geschelin
DETROIT EDITOR

ONE of the most noteworthy events in the field of commercial engine manufacturing occurred earlier this year with the opening of the new Allis-Chalmers Manufacturing Co. plant adacent to the older Harvey Works. Of modern functional construction, the plant has a floor space of around 515,000 sq ft. The Harvey Works, original home of the well known Buda engine line (now the A-C line) was acquired by Allis-Chalmers in 1953.

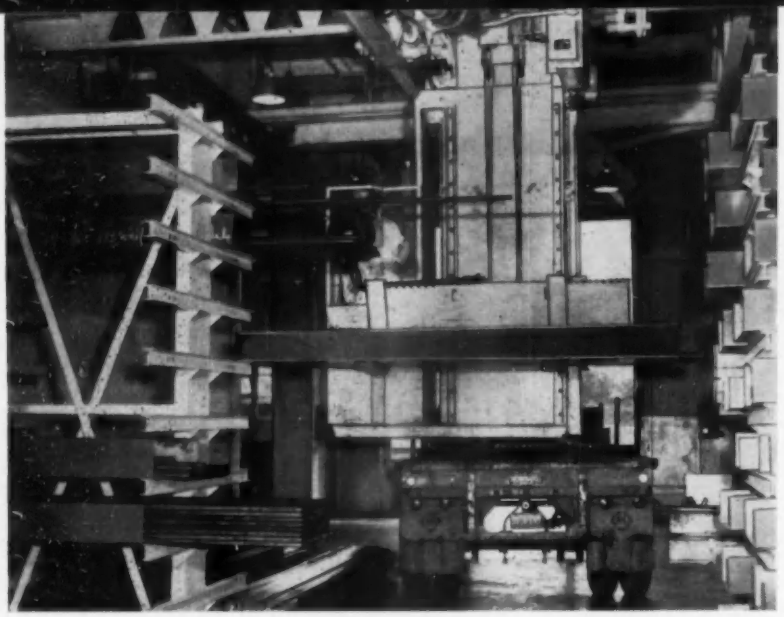
All engine building operations now are concentrated in the new plant, including nine basic Diesel and gasoline engines; and six other models used in the Company's line of material handling trucks. The space released at the Harvey Works, incident to this move, will enable the Company to expand its facilities for the manufacture of material handling equipment of all kinds.

A few details of the building itself may be of interest. It is 1100 ft in length, 440 ft in width, and encloses nearly 11 acres of ground area within its walls. It is of high-bay design with excellent provisions for worker comfort. A heating system of 62-million Btu per hour is provided which includes 49 gas-fired heaters, 16 main supply blowers. There is also a system of 42 exhaust fans. In addition to the exhaust system, the company has installed a number of large Wheelabrator dust collectors to keep the work area free from dust and dirt.

Interior illumination has been developed to provide maximum seeing at the work level. This is effected through the installation of 1682 special 440-volt mercury vapor lamps, served by almost 150 miles of cable and wire and some 140,000 ft of electrical conduit.

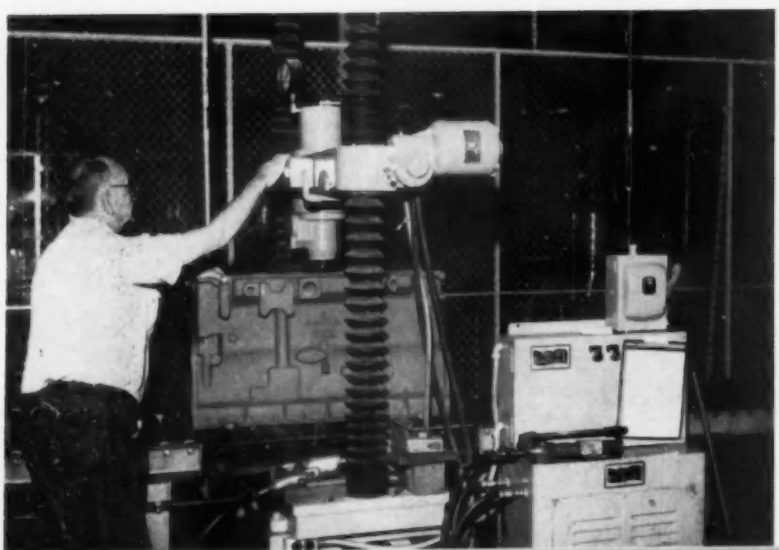
Advance planning for this impressive venture was tied intimately with management philosophy of general interest to our readers. Consider first that for competitive reasons it was necessary to develop a setup conducive to mass production, employing straight-line production methods not only in ma-

The new Snyder tape-controlled multi-head machine for handling special holes in a great variety of flywheels. Holes are added in the vertical, horizontal, and angular locations as required. This machine was described recently (see AI, September 1, 1961).



Three-ton Whitney Trambeam, seen here, performs the functions of a versatile fork lift truck in serving the bay of automatics. Here the fork lift is in the act of unloading incoming raw materials from a truck. The bars are first stored in the rack shown here, later transported to one of the automatics.

One of the two Cleereman tape-controlled drilling machines programmed for drilling operations on intake and exhaust manifolds. As many as 5000 different tapes are required in a six-month period. These machines also can be employed as jig borers when required for tool room work.



One section of the quality control station ahead of the machine lines. Here we see a cylinder block casting being subjected to Brinell hardness checking.

chining but in assembly and testing as well. While the objective is simply stated, consider that the manufacturing problem is complicated by the variety of engines that must be produced over the same lines. In short, it seems simpler to plan for the mass production of a single engine or a small family of engines than it is for an entire line of engines with its innumerable variations.

Yet engineering economy, competitive costs, and the requirements of unfailing reliability make it necessary to employ the most advanced methods and equipment, comparable to a strictly mass production operation.

The general floor plan of the plant is shown schematically, the layout being designed for producing 175 engines in an eight-hour shift. In the overall planning, the management decided to utilize the same machine tools then employed at the Harvey Works for practically all operations except cylinder blocks. This decision was based on the fact that most of the usable machinery was only two or three years old. Consequently, the first step was to remove the equipment, by departments, and piece by piece, for a complete overhauling and repainting. As the older machines were rebuilt or overhauled, the move was made to the new building one department at a time so as to avoid a major shut-down of operations.

The new equipment was purchased primarily to build up three straight-line cylinder block machine lines. All of the equipment and instrumentation for the gasoline and Diesel test departments is new, and embodies distinctive features to be described later. The test area also is served by an interesting Jervis B. Webb power-and-free conveyor system of the latest type. More complete details of the cylinder block department

and test area will be given in the second installment of this study.

It may be noted at this point that the move to the new plant involved some 615 pieces of equipment, including about 220 new machines.

Although discussion of the planning of production lines is being reserved for the next installment, it is noteworthy that the major components—cylinder blocks and heads—have been arranged in families of parts for small and large engines. Thus there are three head machining lines, each of which handles a number of heads; and three cylinder block lines, two for small engines, the other for large engines. Naturally, this requires batch type scheduling of major components. And, to this end, the machine tools are so designed as to require the very minimum of changeover time from one part to another. In fact, we were told that a machine line can be changed from one part to another in about one hour.

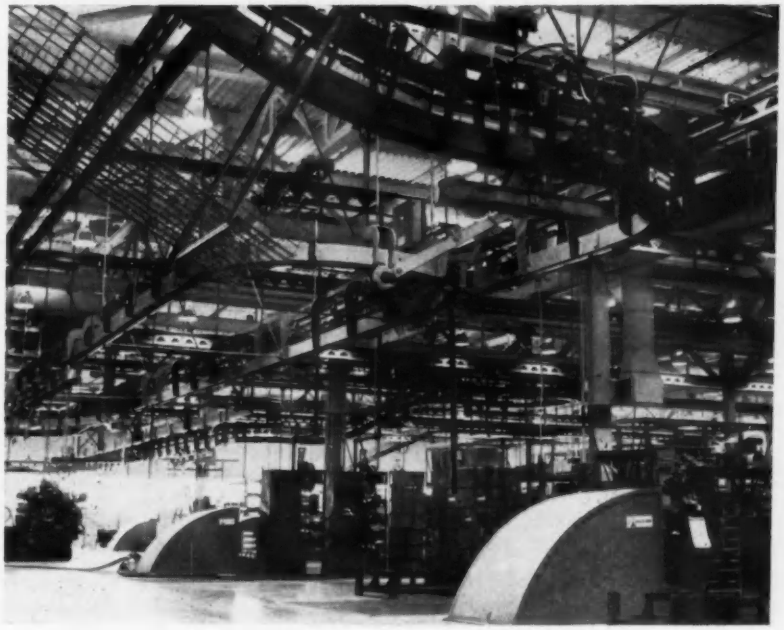
Although the cylinder block and head lines have the appearance of transfer lines at quick glance, actually they are composed of individual multi-spindle, multi-way, semi-automatic machines, connected by gravity roller conveyor sections instead of the transfer bars found on high-production, single-purpose machine lines. Nevertheless, each machine tool in the line has a fully automatic cycle when actuated by the operator.

Perhaps it was reasonable to expect some noteworthy innovations in a new operation of this character; and we were not disappointed. Take tape-controlled machines. Despite the widespread use of such equipment in the aircraft and missile fields, the vehicle manufacturing industries have found but an insignificant number of applications to date. Yet this plant has three tape-controlled machines—two Cleereman single-spindle drilling units; one Snyder Multi-head machine.

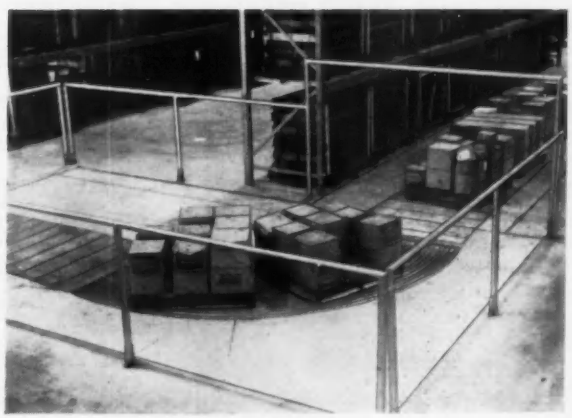
These special machines were installed specifically to meet some special problems unique in the field of commercial engine production. In fact, the pressure of past experience dictated their adoption. Unlike the situation in a passenger car engine plant, A-C has to provide an endless variety of intake and exhaust manifolds to suit the requirements of individual customers. Specifically, the company estimates that in a six-month period they may be required to supply around 5000 different part numbers.

When you have so many variations of a few pieces at a time, it is futile and expensive to plan fixtures and tooling. Here is a problem involving flexibility to a high degree. So A-C management turned to Cleereman for two machines, fitted with tape control. Instead of tooling, each manifold is programmed on an individual tape, thus making it feasible to handle the drilling, tapping, etc., of the gamut of parts, even single items, with dispatch and at the lowest cost. Moreover, the two machines will handle every item that is required. Since these are single spindle machines, the control console is arranged to signal the operator whenever a change in tool is required. Thus it is a simple combination of fully automatic programming, supplemented with some manual tool changing. This

(*Turn to page* 110, *please*)



Wide-angle view in the engine assembly department. The hoods in the foreground mark the turn for the Jervis B. Webb assembly conveyors. Overhead may be seen the maze of Jervis B. Webb power-and-free conveyors in the complex serving the assembly and test stand area.



Ingenious sector mechanism mentioned in the text is found on the receiving inspection conveyor. The slat conveyor to the left transports boxes and crates from the receiving dock. The slat conveyor at the right transports the material to the receiving inspection station. The sector, with flexible grids interspersed among fixed grids, carries the boxes around right-angle corner.

The 1962 Dart

1962 Chrysler Passenger Cars

ACCENTING Chrysler offerings for 1962 is the introduction of an entirely new series—Chrysler 300 (not to be confused with the top performing 300-H sports model). The Chrysler 300 is priced midway between the Newport and New Yorker models. All of the cars, except the New Yorker are mounted on a wheelbase of 122-in., the latter retains the 126-in. wheelbase.

Chrysler achieves a new profile with sheet metal changes at the rear, in the rear quarter panel and deck, and a different pattern of styling for the rear bumper and rear view. Doors too are new, smoothly rounded in cross-section.

Engineering features this year are centered upon items that will reduce maintenance cost: 4000-mile engine lube change, 32,000-mile chassis lube intervals, etc. The major mechanical improvements follow the outline in the separate summary article in this issue.

The line-up of series and models is as follows: **Newport**—2-dr hardtop; convertible coupe, 4-dr sedan; 4-dr hardtop; station wagon. **300 Series**—2-dr and 4-dr hardtop; convertible coupe. **300-H**—2-dr hardtop and convertible coupe. **New Yorker**—4-dr sedan; 4-dr hardtop; station wagon.

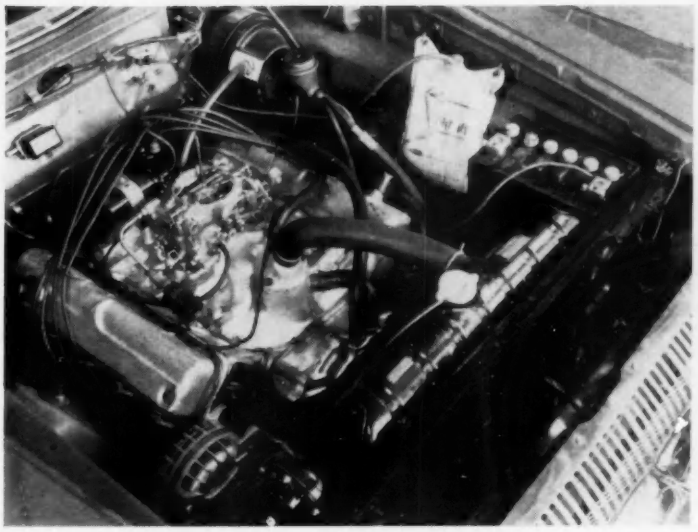
The availability of engine options has been expanded to provide extra performance where desired. The Newport has one standard engine—the regular 361-cu in. V-8 with dual carburetor, rated 265-bhp. On the 300 series, the 383-cu in. V-8 with dual carburetor is standard. In addition three versions of the regular 413-cu in. V-8 are available: with one four-barrel carburetor and 10 to 1 compression ratio, rated 340-bhp; with two four-barrel carburetors, rated 380-bhp. The third version is new this year: it has two four-barrel carburetors, 11 to 1 compression ratio, rated approximately 405-bhp.

The 300-H models employ the standard 413-cu in. V-8, with two four-barrel carburetors, rated 380-bhp. New Yorkers are powered with the regular 413-cu in. V-8 with a four-barrel carburetor, rated 340-bhp.

The 380-bhp version of the 413-cu in. engine embodies a runner type intake manifold, replacing the former ram-type, manifolding dual low restriction air cleaners; high performance camshaft; spe-

In advance of the disclosure of illustrations of the complete Chrysler 1962 lines, descriptions of the individual cars are available. Only the 1962 Dart photograph was released for publication in this issue. The additional photographs will appear in the October 1 issue of AI.

—Editor's Note



The 318 cu in. V-8 Dart engine

Slant Six Dart engine. Piston displacement is 225 cu in. and output is 145 hp.

cial valve springs and dampers; mechanical tappets instead of hydraulic valve lifters; large dual exhaust system; high capacity radiator; and torque-limiting fan drive.

When this engine is specified, the car is equipped with a sway bar; 7.60 x 15 tires (instead of the standard 8.00 x 14 tires); and special brake linings. The car also is fitted with power steering, power brakes, and automatic transmission.

The new 405-bhp version of the 413-cu in. V-8 will be made available in kit form and only in limited numbers. This kit will include two four-barrel carburetors mounted on a ram-type intake manifold, tuned for maximum output at high speeds; special exhaust headers with 4½-in. exhaust system; special high output camshaft; special mechanical valve gear (instead of hydraulic valve lifters); plus other modifications.

The 300-H chassis is fitted with heavy duty front and rear springs; heavy duty shock absorbers; sway bar; special brake linings; nylon Blue-Streak 7.60 x 15 tires.

The manual transmission is standard with the 305- and 340-bhp engines. All 300 and 300-H models have 3.23 to 1 ratio rear axles regardless of the type of transmission.

On New Yorker models, dual exhausts are supplied only with the station wagon. The 10-hp decrease in the rating of the New Yorker engine stems from a new camshaft, placing more emphasis upon durability and quietness than on output.

All Chrysler engines have an improved cooling fan with a projected depth of 2-in.

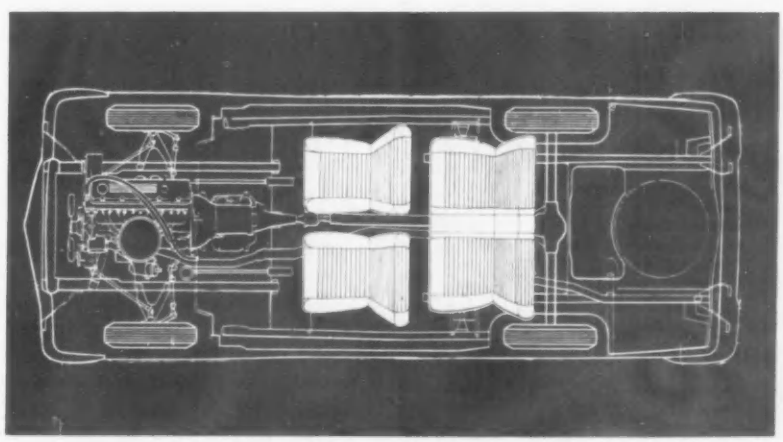
The new TorqueFlite automatic transmission is standard equipment on all models except the Newport and 300-series, being available on the latter at extra cost. Manual shift models have a floor-mounted gearshift lever.

The new power brake system features a high runout line pressure, up to 1150-psi, providing extra reserve against brake fade.

The Dart and the Polara

IN its standard-size car line, mounted on a 116-in. wheelbase, the Dodge Division unveiled the limited-production Polara 500 — a luxury sports model available as a two-door hardtop or a convertible —in addition to its restyled Dart models.

Dart models have adopted new series identifications, embracing a



Arrangement of seats in the Lancer Grand Turismo

1962 LANCER DIMENSIONS

EXTERIOR

	2-Door Sedan 4-Door Sedan 2-Door Hardtop
	1962
Length—Standard Equipment	188.8
Width—At Center Pillar	67.0
Height (5-Passenger Load)	53.4
Wheelbase	106.5
Tread—Front Wheels	55.9
—Rear Wheels	55.6

INTERIOR

	2-Door Sedan 4-Door Sedan 2-Door Hardtop
	1962
Effective Head Room—	
Front Seat	37.9
Rear Seat	37.4
Leg Room—Front Seat	43.8
—Rear Seat	39.8
Hip Room—Front Seat	56.8
—Rear Seat	56.9
Seat Height—Front Seat	11.2
—Rear Seat	13.7
Knee Room in Rear Seat	27.9

1962 LANCER CHASSIS SPECIFICATIONS

	Sedans & Hardtop
Wheelbase, in.	106.5
Tread, in.—Front	55.9
—Rear	55.6
Suspension	
Front—Type	Torsion Bar
Rear —Type	Leaf
Wheel Rate (Estimated) lb./in.	
Front	100
Rear	120
Brakes	
Size, in.—Front	9.0 x 2.5
—Rear	9.0 x 2.0
Lining Area, sq. in.	153.5
Transmission	
Manual, 3-Speed	
Gear Ratios	R-3.49; 1-2.95; 2-1.83; 3-1.00
Clutch Type	Dry Plate
Diameter, OD-ID, in.	9.125 x 6.125
Automatic, 3-Speed	
Gear Ratios	R-2.20; 1-2.45; 2-1.45; 3-1.00
Converter Dia., in.	10.75
Max. Ratio at Stall	2.2
Rear Axle	
Standard Gear Ratios	
Manual 3-Speed	3.55
Automatic 3-Speed	3.23 (a)
Fuel Tank, gal.	14.0
Electrical	
Alternator	35 amp; 3-phase; full-wave silicon-diode rectifier
Engine	
Type	6-cyl; 30° inclined; in-line; OHV
Bore, in.	3.4
Stroke, in.	3.125 (b)
Displacement, cu. in.	170 (b)
Compression Ratio	8.2
Carburetor—Type	1-barrel; downdraft
Valve Diameter, in.	
Intake	1.62
Exhaust	1.36
Bearing Diameter, in.	
Main	2.75
Connecting Rod	2.19

(a) 2.93 with 225-cu. in. engine.
(b) Opt. Aluminum block engine; 225-cu. in. and 4.125 stroke; other details are the same.

line-up of 23 models as follows: **Dart**—two- and four-door sedans; six passenger station wagons, available with either six-cylinder or V-8 engines. **Dart 330**—two- and four-door sedans; two-door hardtop; six-passenger and nine-passenger station wagons. All models are available with six- or eight-cylinder engines, except the nine-passenger wagon which is equipped with a V-8. **Dart 440**—four-door sedan; two- and four-door hardtop; convertible; six-passenger and nine-passenger station wagons. All models are available with either the six- or eight-cylinder engines, except the four-door hardtop, convertible, and station wagon which are offered only with the V-8.

The Dart front grille is of stamped aluminum. The Polara 500 grille is of anodized aluminum.

All Dart 440 models have individual seat styling with split seat backs, individual bolsters, and a pull-down center armrest for the front seat.

Styling of the Polara 500 features a long hood line and close-coupled rear quarters. Both models have individual bucket seats in front with a console between the seats.

Standard engines for the Dart models are: 318-cu in. V-8, rated 230-bhp; and the 145-bhp 225-cu in. Slant Six. A high performance option also is available. This is the 361-cu in. V-8, rated at 305-bhp, with special camshaft, dual exhaust, and four-barrel carburetor. This engine is standard equipment on the Polara 500.

Darts with six-cylinder engine and automatic transmission are fitted with a 2.93 to 1 rear axle ratio. It may be noted that while the Dart offers the new V-8 automatic transmission, the Torque-Flite Six drive also is available on all six-cylinder engine models. The 1962 version, however, is smaller and lighter, employs a 10¾-in. diameter torque converter.

A 2.76 to 1 rear axle ratio is provided for Dart V-8's with an automatic transmission.

Distinctive feature of Dodge models is the adoption of a flexible, stainless steel cable for the throttle linkage, operating in a self-lubricating plastic liner.

DODGE POLARA 500

	Dodge Polara 500
Wheelbase	116"
Over-all-length	202.0"
Over-all-width	76.5"
Over-all-height	54.0"
Tread—Front	59.4"
—Rear	57.5"
Turning Diameter	40.3"
Seat height—Front	11.7"
—Rear	12.7"
Headroom—Front	38.0" eff.
—Rear	37.8" eff.
Legroom—Front	46.0"
—Rear	40.9"
Hiproom—Front	60.8"
—Rear	61.0"
Windshield wiper operation	Electric
Tire size	7.00 x 14"
Adjustable Brakes	yes
Brake lining area—eff. sq in.	195.2
Front spring—type	Torsion
Rear spring—type	Leaf
ENGINE, V-8	
Piston displacement—cu in.	361
Bore and stroke—in.	4.12 x 3.38
Compression ratio	9.0 to 1
Horsepower (max.)	305
Torque (max.)	395

A New Dodge Lancer Car

GRAND TURISMO—a two-door hardtop sports model—rounds out the Dodge Lancer line for 1962. The new model has distinctive exterior ornamentation, bucket seats, and a luxurious all-vinyl interior. The Lancer line consists of seven models: two- and four-door sedans; and a four-door station wagon in the regular Series 170 and 770; and the two-door hardtop in the GT series.

The new grille is of three-piece design, made of anodized aluminum.

The 170-cu in. six-cylinder engine is standard; the new 225-cu in. six cylinder aluminum engine with die-cast cylinder block is offered as an option. Front mounts for the engines are 45-deg shear-type rubber blocks. The rear

mounting, of vertical shear type, is attached to the transmission.

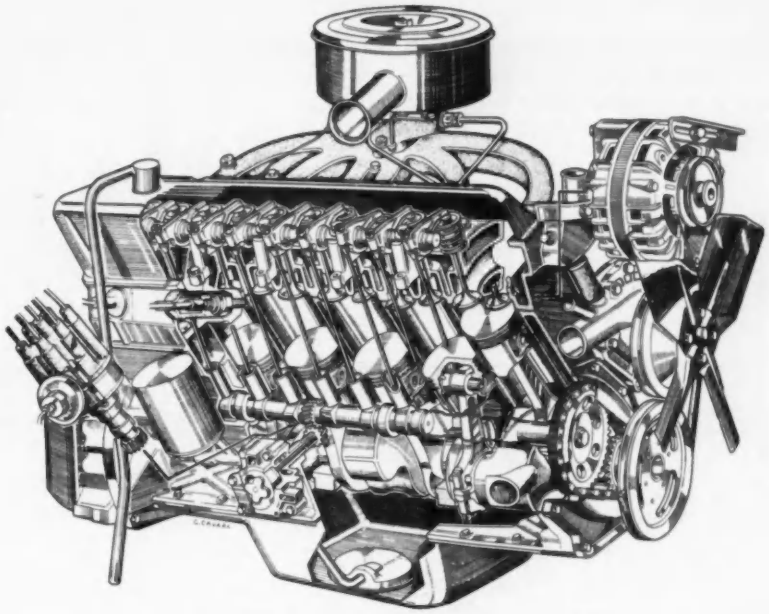
All Lancers equipped with an automatic transmission have a larger venturi carburetor to improve wide-open throttle operation. The choke system has been improved to ensure consistent closing, thereby improving starting reliability.

The exhaust system has been improved by making mufflers with aluminized headers and shell, and thicker-walled tail pipes.

Front suspension details have been revised by simplifying the design of the front suspension lower control arms, making it possible to use a compression type torsion bar adjusting bolt, easier to adjust or replace. The upper control arm too has been altered for easier fabrication and increased structural strength.

Bonded brake linings are employed. The instrument panel employs a printed circuit.

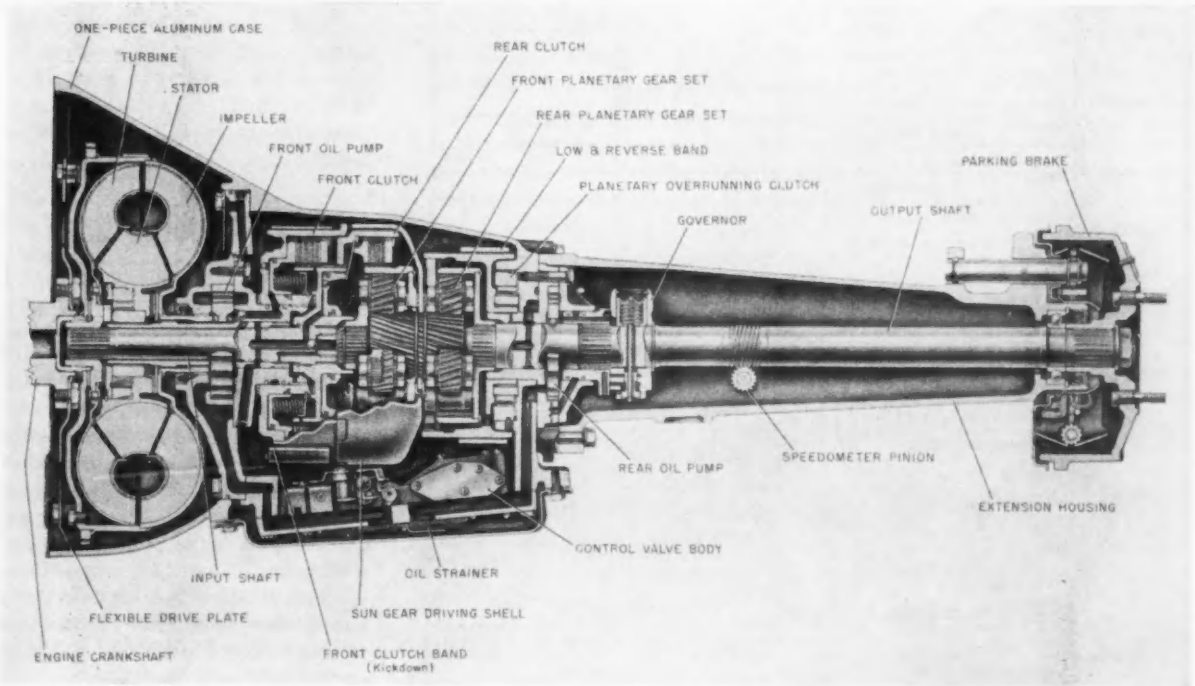
Details of significant engineering design and other mechanical changes will be found in the summary article in this issue.



Lancer 225 cu in., six-cyl aluminum engine

The New Imperial

THE Chrysler Imperial for 1962 has important styling changes that can best be appreciated by viewing the illustrations which will be published early in October. The line-up of models on the 129-in. wheelbase remains exactly the same as before. The noteworthy styling change this year is the new rear quarter line, and the two-



New lightweight transmission used in the Imperial

piece zinc die-cast grille in front. The slim, tapering body side molding is of rolled stainless steel, with a chromium-flash finish, with a chromium-plated die-cast section on the quarter panel and front fender brow. A wide stainless steel sill molding is standard on the LeBaron, optional at extra cost on the other models.

Another touch of distinction is a bright, die-cast molding extending downward from each taillamp and across the entire deck lid lower edge.

The separate summary of major mechanical features of Chrysler Corp. cars gives most of the new items found in the Imperial line. It is also well to stress at this point that all of the cars in the Imperial line have a separate chassis frame.

The standard 413-cu in. V-8 with a single, four-barrel carburetor and 10 to 1 compression ratio embodies numerous refinements. The automatic choke is modified to increase efficiency of operation. A single exhaust system is used on all models except convertibles, the latter retaining dual exhausts. In addition, the engine has refinements in camshaft and valve train to promote quieter operation.

The new automatic transmission is 60 lb lighter than the previous TorqueFlite drive and is more compact. The Imperial retains the transmission-mounted parking brake.

Front shock absorbers have larger, softer bushings; rear shocks have softer bushings. Front suspension and rear axle jounce bumpers are of taller and softer design.

IMPERIAL CHASSIS SPECIFICATIONS

				CUSTOM, CROWN, LEBARON
				1962
Wheelbase, in.				129.0
Tread, in.	Front			61.8
	Rear			62.2
Turning Diameter, ft	Curb to Curb			48.8
	Wall to Wall			52.3
Suspension	Front	Type		Torsion Bar
		Diameter, in.		1.04
		Length, in.		48.6
	Rear	Type		Leaf Spring
		Spring: - Length, in.		60.0
			Width, in.	2.5
			Number of Leaves	6
	Wheel Rate, lb/in.	Front		130
		Rear		140
Power Steering	Gear Ratio			15.7
	Wheel Turns, Lock to Lock			3.5
Brakes	Size	Front, in.		12 x 2.5
		Rear, in.		12 x 2.5
	Lining Area, sq in.			251
Transmission Gear Ratios				2.45 - 1.45 - 2.20
Torque Converter	Nominal Diameter, in.			11.75
	Stalled Torque Ratio			2.2
Rear Axle	Ring Gear Diameter, in.			8.75
	Gear Ratio			2.93
Capacities	Fuel Tank, gal.			23
	Engine Crankcase, qt			5
	Cooling System	Without Heater, qt		16
		With Heater, qt		17
	Transmission, pt			21
Electrical	Battery	Voltage Rating		12
		Total Plates		78
		Amp-hr @ 20 hr		70
	Spark Plug			A-42
Wheel & Tire	Rim Width, in.			6L
	Tire Size, in.			8.20 x 15
Engine	Type			90° V-8
	Bore and Stroke, in.			4.18 x 3.75
	Displacement, cu in.			413
	Compression Ratio			10:1
	Carburetor	Type		4-bbl
		Throttle Bore, in.	Primary: 1-7/16; Secondary: 1-9/16	
	Valve Diameter, in.	Intake		2.08
		Exhaust		1.60
	Bearing Diameter, in	Main		2.75
		Connecting Rod Journal		2.375
	Oil Filter			Full Flow
	Cooling System	Radiator Cap		Pressure-Vent
		Pressure, psi		14
	Recommended Fuel			Premium

1962 Plymouth Series

FRESH styling and a long list of mechanical improvements (some of which are discussed in the summary article in this issue) are among the many distinctive features of the Plymouth series for 1962. Twenty-three models are available in three complete lines—Savoy, Belvedere, Fury. The line-up includes 10 sedans, five hardtops, one convertible, seven station wagons, mounted on 116-in. wheelbase.

Powerplant options remain quite similar in specifications and ratings to those offered last year: standard engines—225-cu in. Slant Six and 318-cu in. V-8, both using regular

(*Turn to page* 118, *please*)

Plastics in the AUTOMOTIVE INDUSTRIES

PART III . . . FLUOROCARBONS

By
Norman M. Lloyd
MARKETS EDITOR

ALTHOUGH an estimated 85 per cent of all fluorocarbon materials are used in refrigerants and aerosol propellants, resin makers, formulators and fabricators are combining the hard sell with hard performance, in a strong bid to improve their position on the plastics best seller list.

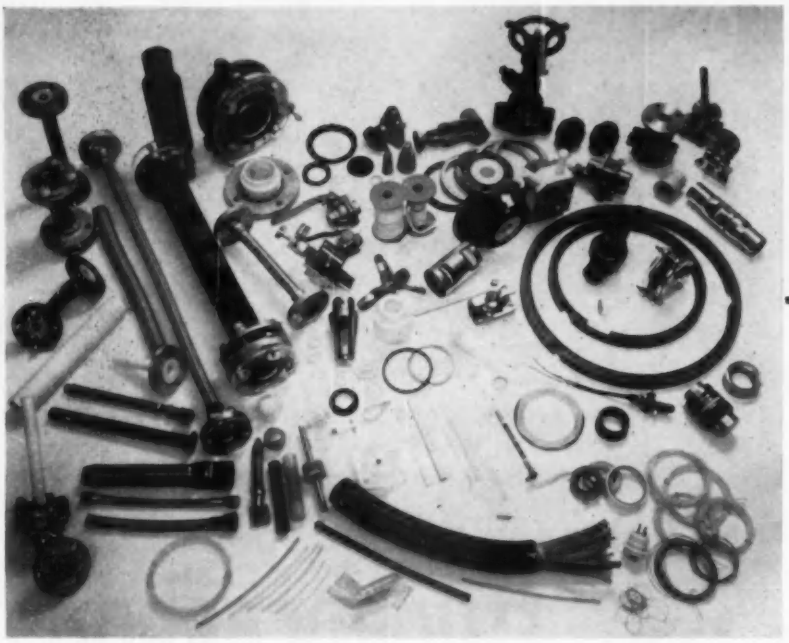
The obvious automotive market has been somewhat out of focus due to the relatively high cost of resins ($3 to $12 per pound in carload lots). Recent price reductions, however, such as du Pont's Teflon, FEP—down from $9.60 to $6.60—are expected to encourage more extensive use of these materials.

The combination of properties of fluorocarbon plastics that just might make a production figure of 28 million lb by 1965 a conservative estimate are: outstanding resistance to chemicals and solvents, high thermal stability, excellent dielectric properties, and great natural lubricity.

The following article represents the third part of a series of special reports on plastics—what they are, and how they are being used in the automotive manufacturing industries. The information is presented in semi-technical language for the benefit of those who have a specific interest in plastics as engineering materials.

Part I—Nylon—appeared in the April 1 issue of AUTOMOTIVE INDUSTRIES; Part II—Epoxies—was published in the July 15 issue

Control center of amphibious Army LARC-5 requires no lubrication thanks to 69 rod-end bearings made with fabric of Teflon TFE fiber.



Some of the wide variety of uses for fluorocarbon resins include overbraided hose, impellers, expansion joints, seals, gaskets, packings, caps, pump bodies, tubing, diaphragms, tape, piston rings, insulators, printed circuits and cable jacketing.

Despite their high cost, this family of materials is of increasingly greater importance to the engineer for applications where service requirements are severe.

Basic Resins

Fluorocarbons have a molecular structure consisting of carbon and fluorine atoms. Their unique physical and chemical properties are the product of very strong primary bonds in the polymer chain and the symmetrical arrangement of fluorine atoms which form a protective sheath for the carbon chain.

Principal fluorocarbon resins available today include tetrafluoroethylene, trifluorochloroethylene (sometimes called chlorotrifluoroethylene), vinylidene fluoride, and fluorinated ethylene propylene.

Du Pont's Teflon TFE (tetrafluoroethylene) resins were researched during the late 1930's, and came as an unexpected bonus during the development of a series of fluorinated hydrocarbon gas refrigerants (Freon). Calcium fluoride is reacted with sulfuric acid to give hydrogen fluoride, which in turn, is reacted with sulfuric acid to give chlorodifluoromethane. Pyrolysis (decomposing by heat) converts this to a gaseous tetrafluoroethylene monomer which is polymerized by heat and pressure.

Although classified as a thermoplastic, TFE resins show practically no tendency to melt or flow. Above 620 F, the solid polymer degrades into a transparent gel. Since melt viscosities are not low enough for conventional melt processing, a process resembling powder metallurgy is used for fabrication—cold forming followed by a sintering operation at temperatures of 620 F-750 F (see Processing).

Fluorinated ethylene propylene (Teflon FEP), also produced by du Pont, is the polymer of tetrafluoroethylene and hexafluoropropylene. While retaining essentially all the properties of the TFE resins, FEP resins are true thermoplastics that become fluid at temperatures in the range of 550 F to 750 F, and can be processed in con-

Fig. 1—Coefficient of Friction: Effect of Load (@ < 2 ft./min. and room temperature)

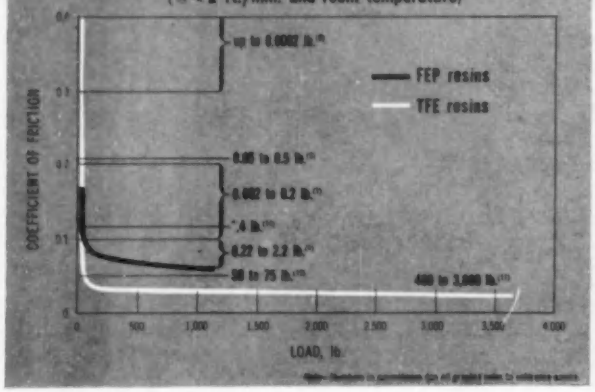
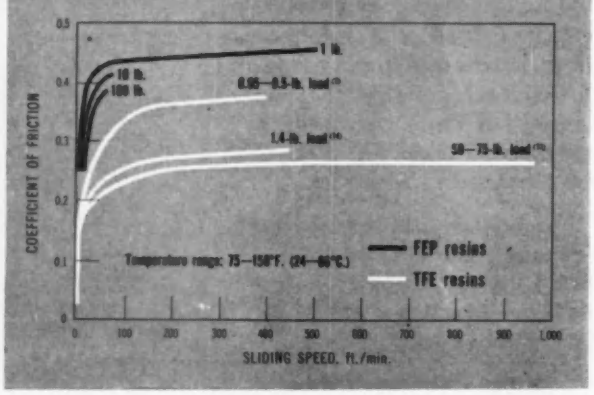
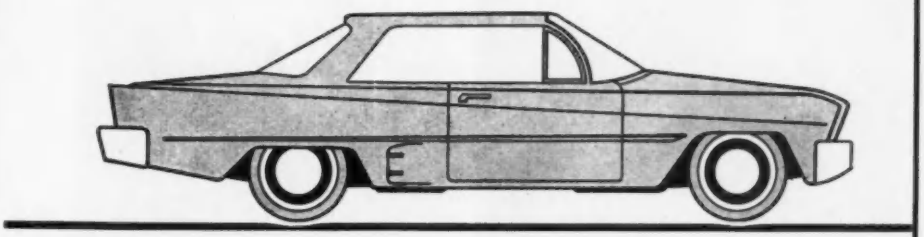


Fig. 2—Coefficient of Friction: Effect of Sliding Speed





AUTOMOTIVE APPLICATIONS FOR FLUORCARBONS

Carburetor throttle valve bearings
Automatic Choke Shaft Bearings
Thrust Bearings on Speed Controller
Governor Control Bell Crank Bushings
Diaphragm for Transmission Switch
Bearing for Clutch Lever

Additive in Transmission Grease
Push Rod Wear Tips
Backup Rings
Wire Insulation for
High Temperature Locations
Thermostats
Valve Seats and Seals

Shaft Seals and Piston Rings for
Power Steering
Piston Rings for Booster Cylinders
Ball Joint Bearing Surfaces
Grease Additive for Ball Joints
Bearings on Brake System
Brake Line Hose

Dust Seal, Seat Adjuster
Bushings, Radius Arms
Compressor Discharge Hoses
Rod End Bearings
Control Cables
Seals and Gaskets

Packings
Valves and Valve Body
Impellers
Expansion Joints
Tubing
Tape

Insulators
Battery Cases and Separators
Dust Seals
Transmission Seals
Brake Cup Seals
Ball Bearing Seals

Water Pump Seals
Universal Joint Seals
Main Bearing Crankcase Seals

ventional melt extrusion and injection molding equipment.

The trifluorochloroethylene (i.e. Allied Chemical, Minnesota Mining and Manufacturing) are made up of a carbon skeleton with two halogens—fluorine and chlorine. The chlorine atom contributes to the transparency, rigidity, and the "built-in" moldability of the resin. The fluorine is responsible for the zero moisture absorption and chemical resistivity.

Allied Chemical's Halon series are unmodified crystalline polymers composed almost entirely of trifluorochloroethylene. Type VK has small amounts of two proprietary materials. Resin structure is such that crystallinity, clarity and flexibility can be controlled by treatment during processing. Rapidly quenched, it yields greater transparency and flexibility. Slow cooling maintains rigidity and the product becomes more translucent and cloudy.

Kel-F (Minnesota Mining and Manufacturing) is another "chloro" that notably retains high impact strength and rigidity at room temperature due to the presence of the chlorine atom. By heat treating at temperatures between 300 and 380 F, it can be crystallized to provide a tougher and more rigid material without sacrificing stability.

Newcomer to the fluorochemicals is Pennsalt Chemical's Kynar—a vinylidene fluoride. Chemically, it is a crystalline, high polymer of vinylidene fluoride $(CH_2\text{-}CF_2)_n$, containing over 59 per cent fluorine by weight.

Properties

A simple catalogue of differences in properties between tetrafluoroethylene and trifluorochloroethylene would include: TFE—higher service temperatures and more favorable electrical and chemical properties; CFE—melt-processible, higher tensile strength and resistance to deformation under load and flexural modulus at room temperature. Melt-processible FEP (fluorinated ethylene propylene) retains essentially the same properties as TFE, and vinylidene fluoride is closely allied in performance to CFE.

Polytetrafluoroethylene—Du Pont's "bread-and-butter" TFE resins have exceptional insulation resistance. Capable of continuous service at 500 F, they have also performed successfully at temperatures as low as 450 F (liquid helium service). Extent of degradation at high temperatures is small: at 735 F, weight loss stays below 0.1 per cent per hour. Yield strength and tensile strength are at least 200 psi at 725 F (a range well above the gel point—621 F).

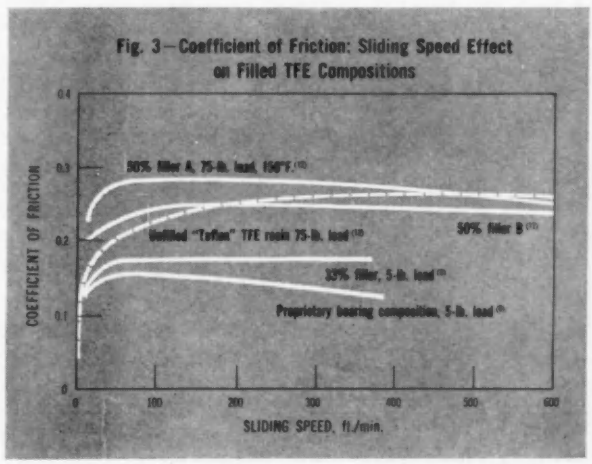


Fig. 3—Coefficient of Friction: Sliding Speed Effect on Filled TFE Compositions

Charts demonstrating

COEFFICIENTS OF FRICTION

At 644 F tensile elongation is 1700 per cent, a function of the plasticity of TFE just above decomposition.

TFE is virtually inert to all commercial chemicals and solvents with the exception of molten alkali metals, fluorine gas, and certain halogenated chemicals at high temperatures and pressures. Water absorption is less than 0.01 per cent (ASTM D570-42).

Kinetic coefficients of friction as low as 0.04 have been measured between surfaces of TFE. Between TFE and steel it is 0.01 to 0.04. This compares favorably with the best lubricated surfaces and is better than such solid lubes as molysulfide and graphite. These values are independent of temperature up to degradation. Static coefficients are equal to dynamic values, so that TFE does not exhibit a stick-slip type of motion.

Related to this inherent lubricity is the unusual property of non-adhesiveness. Sticky or viscous materials do not adhere to the surface unless one of several surface pretreats is used for "gluing." Special resin-etching solutions are available that leave a carbonaceous film for the adhesive to bond to. Other product forms, such as sheets or wire insulation, come with surfaces that have been prepared with graft copolymerization that will accept most conventional adhesives. Another method relies on mechanically created "sandpaper surfaces" of fine silica particles which provide a "tooth" to which adhesives can lock.

TFE also shines as a dielectric. Its power factor is low over a wide frequency spectrum — less than 0.0003, 60 cycles to 30,000 megacycles). Its dielectric strength remains high over a wide range of temperatures, and it does not "track" on exposure to arc. Volume resistivity is great (10^{15} ohm-cm), with zero water absorption.

TFE's mechanical properties are good, although slightly inferior to the polytrifluorochloroethylenes. It retains its flexibility over a wide range of temperatures, and its high elongation is evidence of its toughness.

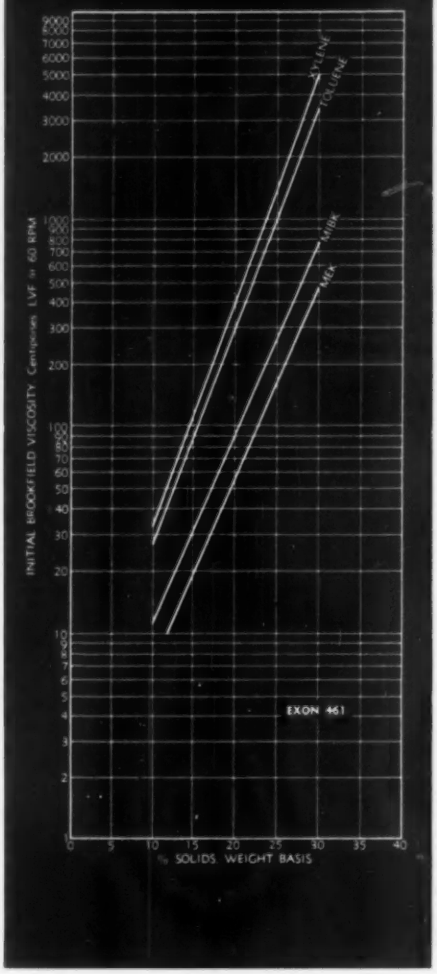


Fig. 4
SOLUBILITY OF FIRESTONE'S EXON 461
in Aromatic, Ketone and Ester Solvents

Inherent lubricity of fluorocarbons points to freedom from lubrication for automotive joints subject to high loads at low speeds. (Du Pont)

In addition to these unmodified properties, various fillers can be used to boost performance. Typical reinforcements would include glass fibers, molybdenum powder, graphite, asbestos, silicates and metallic materials. Various properties and the approximate amount of increase obtained with compounded TFE resins are:

resistance to initial deformation under load	25 per cent
resistance to rotating shaft wear	500 times
stiffness	2 to 3 times
thermal conductivity	5 times
resistance to creep	2 times
thermal dimensional stability	2 times
hardness	10 per cent

Polytrifluorochloroethylene is an injection-moldable fluorocarbon with improved mechanical properties and low mold shrinkage. But service temperatures are lower than TFE and chemical and electrical properties are not quite as favorable.

Halon (Allied Chemical) is tough, with exceptional impact strength. Tensile and comprehensive strength is good with excellent resistance to abrasion. There is little cold flow at room temperature, and recovery is substantially complete when the load is released.

Its mechanical properties remain useful up to 390 F (Halon TVS), and in thin sections, it can be flexed at —320 F.

Chemically, this resin is extremely resistant to most all organic corrosive liquids, including oxidizing acids and organics. Some halogenated materials and oxygen-containing compounds will swell Halon to a limited degree.

Its dielectric constant is low with a good power factor at high temperature and high frequency. As frequency increases, dissipation factor peaks at 10^4 cycles per second and decreases to 0.004 at 10^9 cycles per second. Arc resistance and volume resistivity are both high.

Halon Type VK reportedly is not affected by sunlight after outdoor weathering tests for over a year. Type TVS is expected to possess similar weatherability.

In this carburetor choke assembly, Teflon bearings permit spring to rotate with minimum friction—prevent sticking.

Minnesota Mining's Kel-F has a high compressive strength, low deformation under load, and good plastic memory. It can be fabricated in a relatively transparent form, and exhibits good performance at low temperatures. Mechanical properties include a high tensile strength (27,000 psi at —320 F) with a gradual falloff until reaching the softening point.

Unaffected by most corrosive chemicals and resistant to most organic solvents, it swells slightly with some halogenated and aromatic materials. The swelling does not, however, preclude its use with reagents.

Kel-F performs satisfactorily over a temperature range of about 800 F, from —400 F to 400 F. Under certain conditions, it has been used at temperatures close to absolute zero (—460 F).

Insulation resistance is high over extended periods through thermal cycling and high humidity. Arc resistance is greater than 360 seconds, with no evidence of carbonization, in the electrode area. The dissipation factor and dielectric constant are those of better grade insulators.

As with all fluorocarbons, the material is non-wetting and zero moisture absorbent.

Supplied as a high or low density molding powder, Kel-F can be molded with conventional equipment by injection, compression, transfer and extrusion methods.

Fluorinated Ethylene Propylene—Teflon 100 FEP is du Pont's relatively new fluorinated ethylene-propylene. In properties, it is very similar to the much-used TFE types except that it is melt processible, and can be molded and extruded like other thermoplastics.

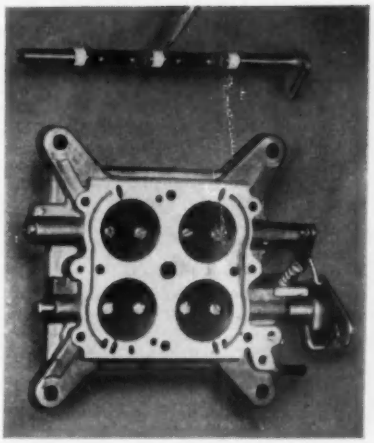
FEP shares the physical, electrical and thermal properties of TFE resins in continuous service up to 400 F, compared to the 500 F for TFE. When fillers are added, some of these properties suffer (electrical) and some are improved (bearing wear). Filled FEP can be compression and injection molded, but extruded only at slow rates. Pressure bonding to metals and other materials is possible with both filled and unfilled FEP.

Vinylidene Fluoride—The more important mechanical properties of

TABLE I

The Properties of "Teflon" TFE- and FEP-Fluorocarbon Resins

Property	ASTM Method	TFE	FEP
Specific gravity	D792	2.13-2.20	2.14-2.17
Refractive index	D542	1.350	1.338
Tensile strength, psi	D638, D651	2,000-6,000	2,700-3,100
Elongation, %	D638	100-350	250-330
Modulus of elasticity in tension, 10^5 psi	D747	0.58	0.50
Compressive strength, psi	D695	1,700	—
Impact strength, Izod, ft-lb/in.	D256	3.0	no break
Hardness, Rockwell	D785	D50 D96 (Shore)	R25
Coefficient of friction	—	as low as 0.02	as low as 0.05
Thermal conductivity, 10^{-4} cal/sec/cm²/°C/cm	C177	6	6
Specific heat, cal/°C/gm	—	0.25	0.28
Thermal expansion, 10^{-5}/°C	D696	10.0	8.3-10.5
Continuous service temperature, °F	—	500	400
Volume resistivity, ohm-cm	D257	$>10^{18}$	$>2 \times 10^{16}$
Dielectric strength, (1/8 in.) short-time, v/mil	D149	400-600	500-600
Dielectric constant, 60—10^6 cycles	D150	2.2	2.2
Dissipation factor, 60—10^6 cycles	D150	<0.0002	<0.0002
Dissipation factor, 10^6 cycles	D150	<0.0002	0.0007
Arc resistance, sec	D495	>300	>300
Water absorption, 24 hr, 1/8-in. thickness, %	D570	<0.01	<0.01
Burning rate	D635	none	none
Effect of sunlight	—	none	none
Effect of weak acids	D543	none	none
Effect of strong acids	D543	none	none
Effect of weak alkalis	D543	none	none
Effect of strong alkalis	D543	none	none
Effect of organic solvents	D543	none	none
Clarity	—	opaque	transparent to translucent



Carburetor throttle shaft bearings used by two major car makers are made from fluorocarbon resin. (Du Pont)

Pennsalt's Kynar include high tensile strength, high impact strength and low cold flow. Its useful temperature range is from —80 F to above 300 F. The crystalline melt point of 340 F permits fabrication to be accomplished at reasonably low temperatures.

The material is resistant to attack or penetration by most corrosive chemicals and organic solvents including mineral acids, oxidants, alkalis, halogens, and hydrocarbons. But strong polar solvents, such as dimethylacetamide, tend to dissolve the polymer. Dark brittle products are formed when reacted with certain strongly basic primary amines, such as n-butylamine.

Stability to ultraviolet radiation is comparable to the highly fluorinated polymers.

As an insulating material, its high dissipation factor and attendant power losses most probably will limit its application to HF and VHF circuits. Its dielectric strength is high in thin films.

Processing

Since tetrafluoroethylene, or FTE, does not exhibit melt flow characteristics common to thermoplastic resins, it is fabricated by a number of techniques (ram extrusion, screw extrusion, compression molding and extrusion with a lubricant), all of which have three basic steps: (1) cold forming, (2) sintering, and (3) cooling.

For molding TFE, granular pow-

PHYSICAL PROPERTIES OF KEL-F PLASTIC, 25°C

Tensile		
Strength	psi	4,500
Elongation	percent	165
Yield Point	psi	4,300
Yield Strength (0.2% offset)	psi	2,100
Modulus of Elasticity	psi	190,000
Impact	ft. lb./in. of notch	3.6
Flexural		
Strength	psi	8,500
Modulus of elasticity	psi	190×10^3
Compressive		
Strength (0.2% offset)	psi	4,300
Modulus of elasticity	psi	132×10^3
Shear Strength	psi	6,400
Specific Gravity		
Crystalline		2.133
Amorphous		2.106

CHEMICAL RESISTANCE OF KEL-F PLASTIC

7-Day Immersion at 25° C.

Chemical Exposure	Weight Change-%	Volume Change-%
Acetone	0.1	-1.1
Benzene	0.1	-1.2
Ethanol, 95%	0.0	-0.8
Methyl Ethyl Ketone	0.2	-0.5
Trichloroethylene	1.8	1.5
Ammonium Hydroxide, 10%	0.0	-0.7
Ethyl Ether	4.4	7.6
Freon 113	0.9	0.6
Hydrochloric Acid, 10%	0.0	-0.5
Sodium Hydroxide, 10%	0.0	-0.9
Nitric Acid, 90% Fuming	0.0	-0.2
Hydrofluoric Acid, Anhyd.	0.0	-0.1
Nitrogen Tetroxide (5° C.)	8.2	9.4
Unsym. Dimethyl Hydrazine	0.0	0.8

Minnesota Mining & Manufacturing Co.

TABLE II

PHYSICAL PROPERTIES of ALLIED CHEMICAL'S HALON SERIES RESINS

	HALON Resin VK	HALON Resin TVS	ASTM Method VK	ASTM Method TVS
Specific Gravity	2.1	2.16	D792	D792
Specific Volume (Cu. in./lb.)	13.2	12.8		
Flammability	Nonflammable	Nonflammable		
Effect of Sunlight—1 year	Nil	Under Test		
Effect of Outdoor Weathering—1 year	Nil	Under Test		
Water Absorption (%)	0.00	0.00	D570	D570
Water Vapor (g/mil/100 in.²/24hr./atm.) Permeability	0.18-0.05	0.015		
Tensile Strength (psi)			D638	D638
70°F	4300	—		
75°F	—	4970		
212°F	1300	3300		
280°F	240	250		
Compressive Yield, 77°F (psi)	4600	7400	D695	D695
Flexural Strength, 77°F (psi)	7400	9300	D790	D790
Modulus of Elasticity, 77°F				
Compressive (psi)	1×10^5	1.1×10^5	D695	D695
Tensile (psi)	—	1.8×10^5	—	D638
Flexural (psi)	2×10^5*	2.2×10^5	D790	D790
Deformation under load, 70°C, constant load (of 250 pounds with VK, 1000 pounds with TVS) for 24 hrs. (%)	25	8.8	D621	D621
Impact Strength Izod, 77°F (ft. lb./in. notch)	27**	4.7	D256 Method A	D256
Hardness				
Durometer—C Scale	95	—	D676	
Durometer—D Scale	—	75	—	D676
Rockwell—R Scale	75	95	D785	D785
Elongation (% at 75°F)	150	205	D638	D638
Abrasion Resistance, g./1000 cycles Taber (CS-10 wheel)	0.8×10^{-2}	0.6×10^{-2}	Fed. Spec. L-P 406-a Method 1091	Fed. Spec. L-P 406-b Method 1091
Moldability	Excellent	Excellent		
Machinability	Excellent	Excellent		
Coeff. of Friction on Steel, Static	0.3	0.3		
Dynamic	—	0.2		

* No definite failure could be obtained under test since the resin does not fracture cleanly.

** Resin does not break cleanly.

TABLE III

der is compressed into dense, coherent shapes at normal temperatures by various preforming techniques which apply uniform pressure to the unheated material. These preformed products are strengthened by heating above 620 F, generally in the range of 700-720 F, until the resin particles coalesce. The material is then cooled below 620 F. Further shaping may be done by coining (for close tolerances), hobbing (for complex shapes) or hot coining (for diaphragms and thin shapes).

Preforming pressures generally range from 2000 to 5000 psi depending upon the size, shape and cross-sectional area of the part. Greater pressures, reaching as high as 10,000 psi are sometimes used for flat discs.

Baking or sintering at temperatures about 700-740 F is done until the preform has reached the gel stage. Rate at which TFE is sintered through the gel point (620 F) is critical since expansion of the preform is greatest at this point. If heat is brought up rapidly, uneven expansion may cause cracks in the part.

Cooling rate after sintering determines, to a great extent, both dimensional tolerances and distortion. Slow cooling, free of the mold, yields higher density and less distortion—tighter control of shrinkage.

Strong, integral continuous shapes such as rods and tubes can be produced by extruding TFE molding powder. Powder is compressed by a ram or screw, and forced through a heated die where it is sintered. Ram extrusion is generally preferred over screw due to more favorable production rates and cost factors. Minus-side factors are that both methods are slow when compared to conventional thermoextrusion.

Another method is used for extruding cable jacketing, tubing and tape. A fine powder is compounded with an extrusion aid or lubricant, such as naphtha thickened with white oil, to form a paste. Preformed under very light pressure,

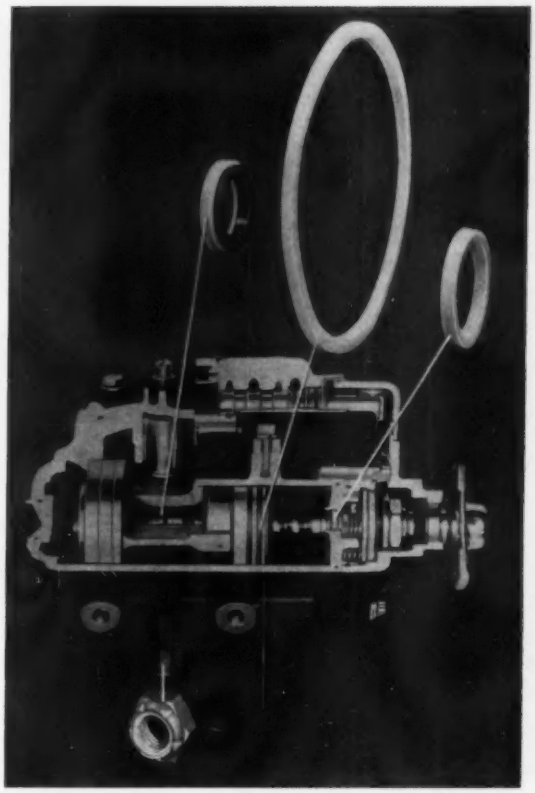
(Turn to page 104, please)

PHYSICAL PROPERTIES OF PENNSALT CHEMICAL'S RC-2525

(Vinylidene Fluoride)

Property	Measurement	Unit	ASTM No.
Clarity	transparent to translucent		
Melting point, crystalline	340	°F	
Specific gravity	1.76		D792
Specific volume	18.7	in^3/lb	
Refractive index, n_D^{25}	1.42		D542
Molding temperatures	400-550	°F	
Mold shrinkage	0.020	in/in.	
Color possibilities	unlimited		
Machining qualities	excellent		
Flammability	self extinguishing		
Tensile strength, 77° F	7000	psi	D638
Tensile strength, 212° F	5000	psi	D638
Elongation, 77° F	300	percent	D638
Elongation, 212° F	400	percent	D638
Yield point, 77° F	5500	psi	D638
Yield point, 212° F	2500	psi	D638
Compressive strength, 77° F	10,000	psi	D695
Modulus of elasticity, 77° F:			
in tension	1.2×10^5	psi	D638
in flexure	2.0×10^5	psi	D790
in compression	1.2×10^5	psi	D695
Izod impact, notched, 77° F	3	ft-lb/in.	D256
Izod impact, unnotched, 77° F	30	ft-lb/in.	D256
Durometer hardness	80	Shore D, scale	
Heat distortion temperature, 66 psi	300	°F	D648
Heat distortion temperature, 264 psi	195	°F	D648
Abrasion resistance, Tabor CS-17, 1/2 Kg load	17.6	mg/1000 cyc	
Water absorption	0.04	percent	D570
Low temperature embrittlement	<-80	°F	
Thermal degradation temperature	>650	°F	
Radiation resistance, Co-60	>100	mega rep	
Thermal coeff. of linear expansion	9.5×10^{-5}	1/°F	D696
Thermal conductivity	1.05	BTU-in/ft² °F hr	

TABLE IV



Power steering unit contains seals, piston ring and lock-nut seal of Teflon TFE. Toughness and low coefficient of friction influenced material selection.

TABLE V

COMPARATIVE PHYSICAL PROPERTIES OF FLUOROSINT* RESIN

	Property	Temperature	Materials					
			Fluorosint	TFE	Filled TFE		Nylon 101	
					35% Glass	35% Graphite	Dry	2.5% Moisture
COMPARATIVE ELASTIC MODULI DATA	Flexural Modulus	73°F.	464,000	80,700	208,000	162,000	420,000	205,000
		212°F.	442,000	28,700	113,000	76,000	93,000	70,000
		500°F.	144,000	6,500	25,900	27,200	—	—
	Compressive Modulus	73°F.	253,000	84,300				
		212°F.	145,000	—				
		500°F.	52,600	—				
	Tensile Modulus	73°F.	190,000	90,000				

	Property	Method	Fluorosint	TFE
PHYSICAL PROPERTIES OF FLUOROSINT AND TFE	Specific gravity	ASTM D792-50	2.3-2.5	2.15-2.2
	Hardness—D scale	Durometer D676-49T	70-75	50-60
	Tensile strength—psi	ASTM D638-56T	750-2500	1500-3000
	Elongation—%	ASTM D638-56T	10-200	75-350
	Deformation under load—%	ASTM D621-51		
	(1200 psi., 24 hrs., 200°F)		0.2	14-18
	(1200 psi., 24 hrs., 500°F)		1.2	22-30
	Coef. of thermal expansion/°F	ASTM D696-44		
	73°-140°F		1.1×10^{-5}	6.9×10^{-5}
	73°-500°F		1.7×10^{-5}	9.7×10^{-5}
	Dynamic coefficient of friction	—	.16	.24
	Flammability, in/min.	ASTM D635-56T	Does not burn	Does not burn

Property data shown are typical average values and will vary on specific production lots. They, therefore, should be used only as a guide to primary selection for application of a given material and never for purchase specifications. Further technical information is available for specific application requirements.

* Polymer Corporation's TFE fluorocarbon base resin modified with inorganic materials

1962 Ford Diesel-powered HD 1000

More Than 600 Models in Ford's 1962 Truck Line

For its 1962 truck line the Ford Division offers over 600 different models in the light and medium, and heavy and extra-heavy models.

The light and medium-duty line of truck models is termed the "Business Fleet." In this category buyers may select any of six economy-type engines, ranging from the 144-cu in. 85-bhp Six to the 292-cu in. 170-bhp V-8.

1962 FORD TRUCK POWER PLANTS

Cubic Inch Displacement	Carburetor	Bore	Stroke	Compression Ratio (to 1)	Gross Horsepower @ RPM	Gross Torque (lb-ft) @ RPM
Gasoline		(inches)				
144	1V	3.50	2.50	8.7	85 @ 4200	134 @ 2000
170	1V	3.50	2.94	8.7	101 @ 4400	152 @ 18-2000
223	1V	3.62	3.60	8.4	135 @ 4000	200 @ 18-2400
262	1V	3.72	4.03	8.0	152 @ 4000	237 @ 1800
292	2V	3.75	3.30	8.0	160 @ 4000	270 @ 18-2000
292	4V	3.75	3.30	8.0	171 @ 3800	274 @ 20-2600
302	2V	3.62	3.66	7.3	180 @ 4000	276 @ 2600
332	2V	3.80	3.66	7.17	192 @ 4000	302 @ 24-2600
401	2V	4.12	3.75	7.5	206 @ 3600	341 @ 16-1800
401	4V	4.12	3.75	7.5	226 @ 3600	343 @ 20-2600
477	2V	4.50	3.75	7.5	231 @ 3400	412 @ 14-1800
477	4V	4.50	3.75	7.5	253 @ 3400	415 @ 20-2600
534	4V	4.50	4.20	7.5	266 @ 3200	481 @ 16-1800
Cummins Diesel						
672 (NH-180)		4.87	6.0	15.5	180 @ 2100	504 @ 1500
743 (NHE-180)		5.12	6.0	15.5	180 @ 1950	534 @ 1300
743 (NHE-195)		5.12	6.0	15.5	195 @ 1950	580 @ 1300
743 (NH-220)		5.12	6.0	15.5	220 @ 2100	606 @ 1600

The heavy and extra-heavy line includes over 300 models of conventional trucks, tilt-cab, and tandem types, embodying refinements in power train and chassis components. Buyers of the heavy-duty vehicles have a selection of 14 six- and eight-cylinder powerplants, including four Diesel engines ranging in horsepower from 180 to 220; and 10 gasoline engines, with ratings from 152 to 266 hp.

The three super-duty V-8's of 401-, 477-, and 534-cu in. displacement are warranted for 100,000 miles or 24 months. They are supplied for vehicles with GVW's up to 51,000 lb, and tractor-trailer combinations up to 76,800-lb GCW.

In addition to the Falcon Ranchero and sedan delivery, trucks in the Business Fleet include the light duty one-half, three-quarter, and one-ton pickups, the Econoline van and pickup, and the one-half and three-quarter ton 4-wheel drive. Medium duty trucks include conventional and tilt-cab series with gross vehicle weights ranging from 15,000 to 21,000 lb.

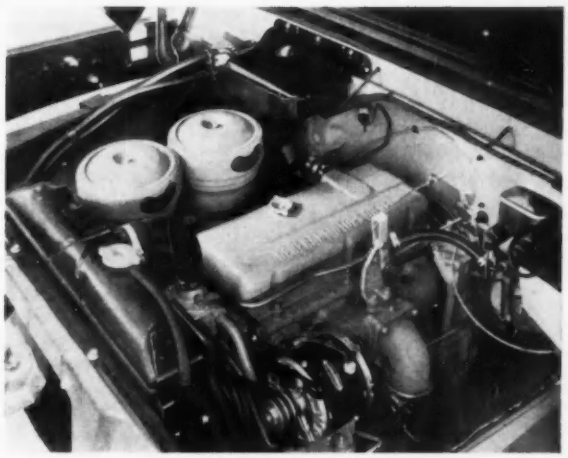
The parcel delivery line includes four models for "stop and go" deliveries with gross vehicle weights from 5000 to 15,000 lb.

A third body style is offered in the light pickup series in 1962. In addition to the Styleside body with integral cab-and-box construction that is standard on the one-half and three-quarter ton series, a separate "Styleside" pickup body is standard on the one-ton pickup and one-half and three-quarter ton 4-wheel drive pickups. The Flareside box, with wooden floor and running boards, is optional on all pickup models, and is available in 6½ and 8-ft lengths.

Especially designed to accommodate greatly varying loads, new variable rate, radius-rod-leaf-type springs are standard on the F- and B-500 through 750 series. The system involves two sets of leaves with different curvature. Effective length of the variable rate springs changes according to the load. The shorter, flatter, lower set of springs does not function unless the vehicle is heavily loaded. ■

CHEVROLET'S *New Line of* TRUCKS

1962 Chevrolet light-duty panel truck



Diesel engine installed in 1962 Chevrolet truck

HIGHLIGHTS of Chevrolet's new line of 198 different truck models are: Diesel power in medium and heavy-duty models; two new larger displacement engines; lower hood lines; and extra heavy-duty optional front suspensions. Other features include restyled radiator grilles with single headlamps in all but three series, and optional alternating current generators on gasoline models.

Engines available for the first time in the truck line include one General Motors Diesel—a 212-cu in., 130-hp in-line four—and two gasoline V8's of 327 and 409-cu in. displacement, developing 185 and 252 hp respectively.

Four six-cylinder engines with basic displacements of 145, 235, and 261-cu in. and two V8's of 283 and 348-cu in. are continued for a total of nine power plants. One version of the 283-cu in. and one of the 348-cu in. engines are discontinued.

The 261-cu in. six is being made available for the first time as a regular option in light- and medium-duty trucks, except forward control models. An oil filter now is standard equipment on all engines.

Suspension systems carry over the independent front wheel suspension with torsion bar springing. For extreme off-road operations, two new extra-heavy-duty optional I-beam front suspensions with leaf springs are available for most models in the heaviest duty series. The suspensions are rated at 9000 and 11,000 lb capacity.

The Corvair 95 line is continued for 1962 with refinements in the design introduced last year. An automatic choke replaces the manual control used in 1961, and a limited-slip differential is made optionally available.

The Diesel lineup consists of 15 conventional cab models on five wheelbases ranging from 133 to 197 in. with cab/axle dimensions from 60 to 124 inches. GVW range is from 15,000 to 23,000 lb.

Power in the Diesel line is supplied by the four-cylinder, two-stroke GM "4-53" engine. It develops 130 hp and 271-lb ft torque.

Electrical equipment on the Diesel includes a 12-volt system with an alternating current generator standard.

The 327- and 409-cu in. gasoline engines give Chevrolet two larger displacement truck engines with higher power and torque. The 327-cu in. engine, rated at 185 hp and 305-lb ft torque, has a bore of 4 in. and stroke of 3¼ in. The 409-cu in. engine is parallel in design to the 348 V8, but with

(*Turn to page* 124, *please*)

With the right woven pile from Schlegel

Moving this window up or down strains neither muscle nor motor.

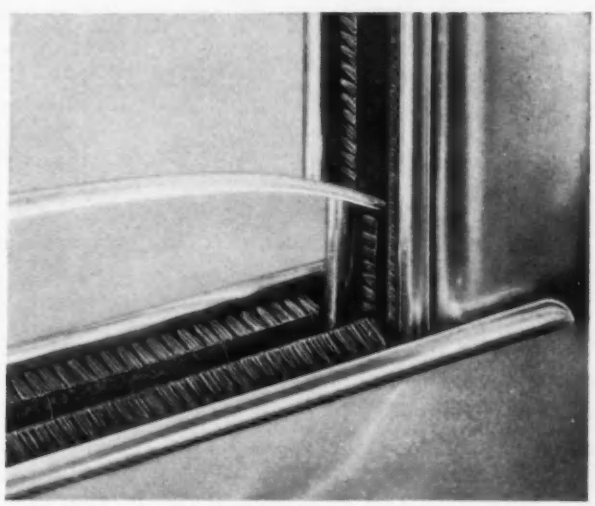
This is a significant accomplishment, considering the glass variances in today's automobile windows. How does Schlegel pile liner make the job so effortless—yet still effectively seal out the elements and eliminate window noise?

The answer is yours. You select the glass run channel and specify Schlegel woven pile liner. We furnish the channel manufacturer with pile fabric of the correct specifications.

Our work doesn't end there. We give you a quality pile which will retain its wear-resistance for years and years to come.

To you (and your car-buyer), Schlegel woven pile liner means easier window movement, rattle-free windows and better sealing qualities. It hugs the glass surface evenly, flexing against wavy surfaces to hold a constant seal.

If that sounds good enough to make you want the best, be sure your next glass run channel utilizes Schlegel woven pile liner. You'll be in good company. Automotive engineers have been specifying Schlegel pile liner since glass windows were first used in cars.



Glass moves friction-free, wet or dry, in this glass run channel with Schlegel woven pile

Schlegel

SERVING THE AUTOMOTIVE INDUSTRY

SCHLEGEL MANUFACTURING COMPANY

1555 Jefferson Rd., Rochester 23, N. Y.
In Canada: Oakville, Ontario

Circle 139 on Inquiry Card for more data

←——Circle 140 on Inquiry Card for more data

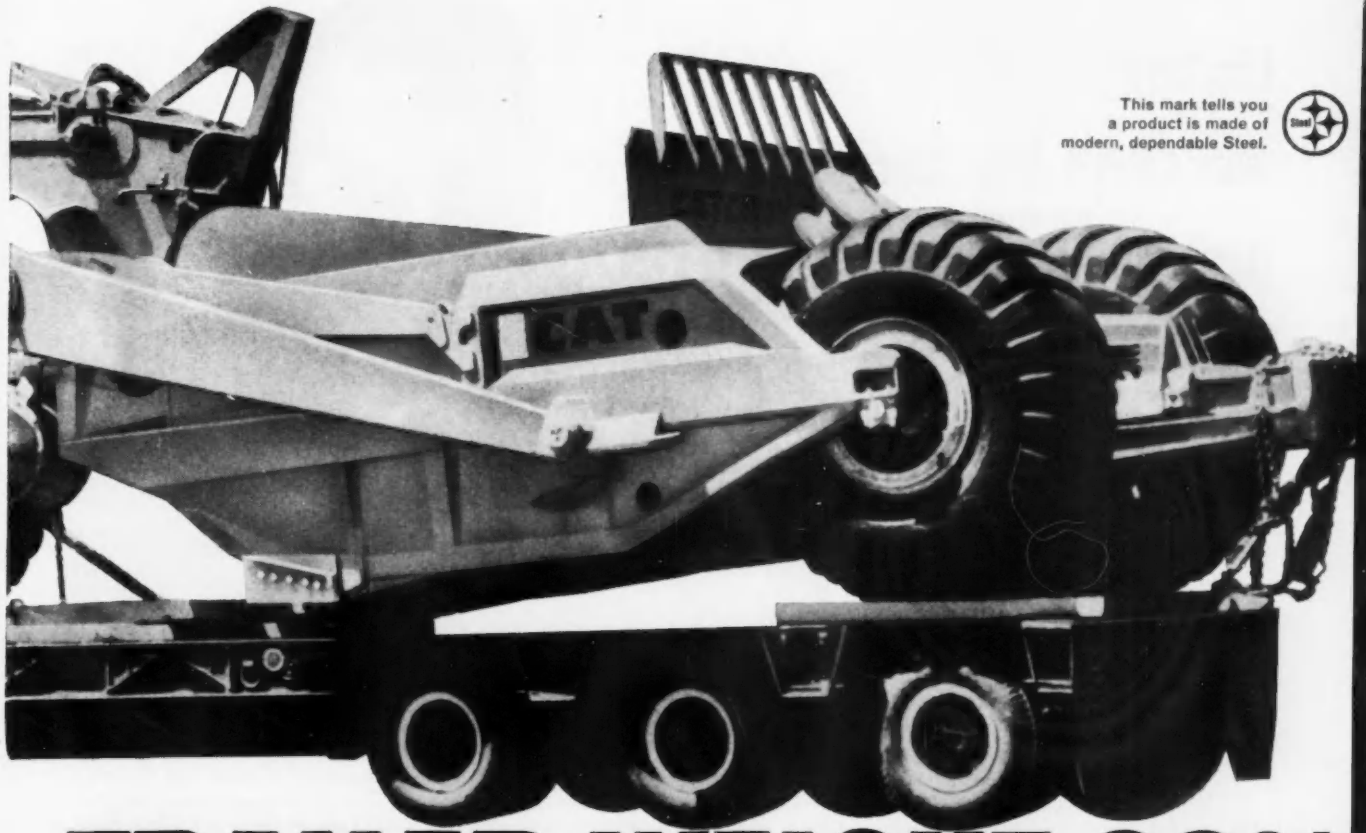
5,000 pounds of weight cut from this 35-ton-capacity Talbert flat-bed trailer by use of USS "T-1" Steel. Empty weight 10,050 pounds.

HOW TALBERT CUTS

Design engineers for Talbert Trailers, Inc., Lyons, Illinois, have produced 35-ton-capacity level-deck trailers weighing only 10,050 pounds. This is a major empty weight reduction of about 5,000 pounds. They also designed and built a new 35-ton drop-deck trailer weighing only 13,410 pounds —or about 33% less than comparable trailers.

Skillful design using the great strength of USS "T-1" Constructional Alloy Steel made possible maximum weight reduction. "T-1" Steel has a minimum yield strength of 100,000 psi and the trailers were designed to a working stress of 35,000 to 40,000 psi.

To control deflection, deeper beams were used on the flat-deck trailer. But on the drop-deck model with raised center-deck design, deeper beams could be used only in the center section with loads straddling these beams. The removable gooseneck and the rear bridge framework also were fabricated from USS "T-1" Steel. These were designed in the shape of arches for better distribution of stress. A 40-ton-capacity drop-deck trailer



This mark tells you a product is made of modern, dependable Steel.

TRAILER WEIGHT 33%

5,000 pounds of weight were also cut from this drop-deck trailer which is designed with shallower but thicker USS "T-1" Steel beams to control deflection. Empty weight 13,410 pounds for 35-ton-capacity model.

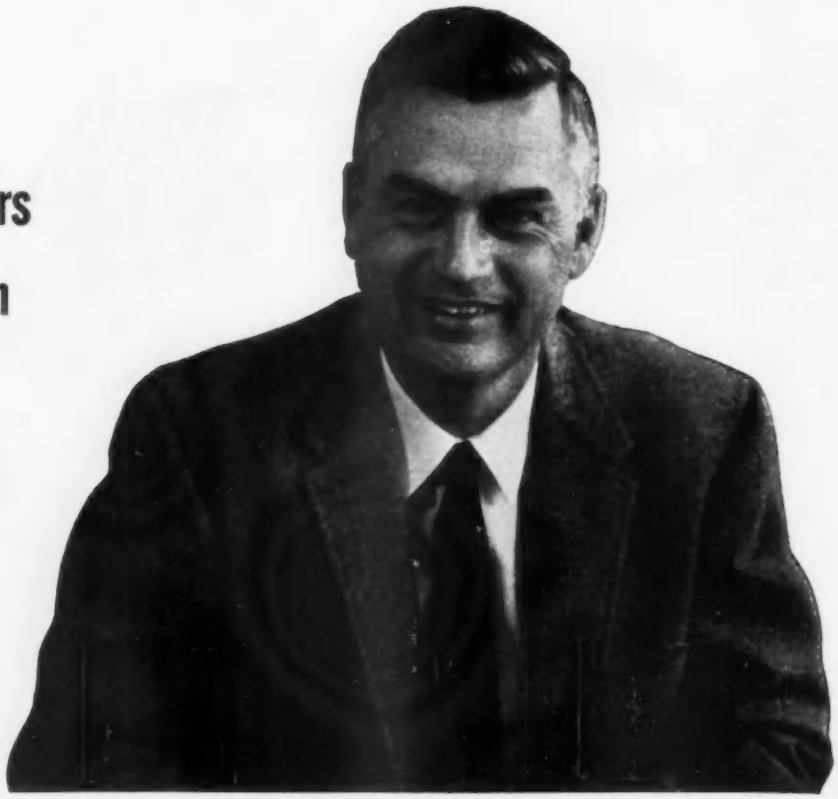
was also manufactured, and fabricated as an outside-beam deck design, which automatically eliminated the two side channels normally used. Deflection was controlled by deeper sections in main longitudinal members. Total weight reduction was approximately 4,500 pounds.

No other metal could provide the combination of strength, weight savings, resistance to deflection and weldability needed for this job. Why not get the complete story of USS "T-1" Steel, or to borrow our new 16 mm sound motion picture, "How to Weld USS 'T-1' Steels" for welder training, write Room 6371, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division Tennessee Coal & Iron Division · United States Steel Supply · United States Steel Export Company

United States Steel USS

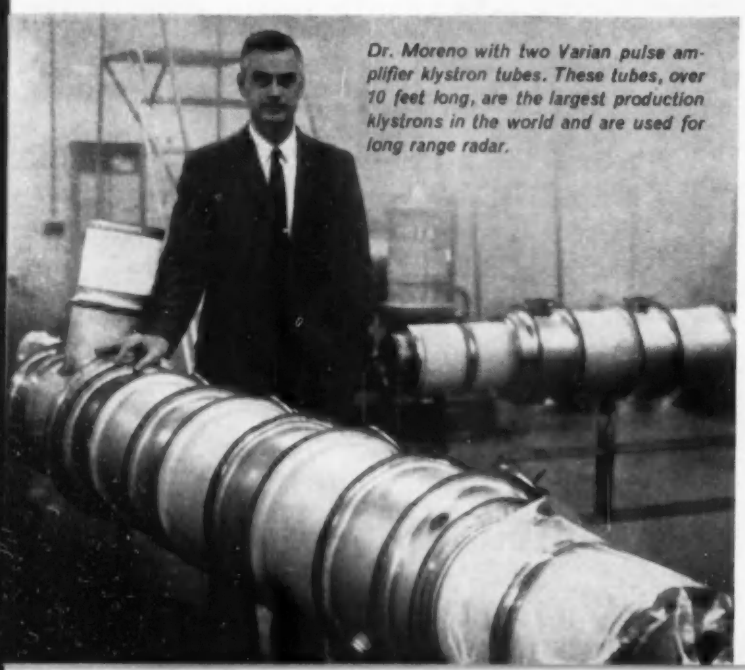
Lindberg atmosphere generators help VARIAN maintain rigid standards in volume production



QUOTE from Dr. Moreno

Dr. Theodore Moreno, Vice President, Tube Division, Varian Associates, Palo Alto, California. Varian Associates is one of the country's foremost producers of equipment for a wide number of fields such as communications, navigation and aircraft control, advanced defense systems including early warning radars, and missile guidance, detection and ranging. Many Varian developments represent important advances in electronic technology.

"Varian's success in the wide variety of electronic fields it serves depends not only on its ability to develop a technologically superior product but also on the development and maintenance of the production standards and capabilities required to retain this superiority in volume production. Our Lindberg Atmosphere Generators are making an efficient and dependable contribution to the consistent maintenance of these highly precise production standards."



Dr. Moreno with two Varian pulse amplifier klystron tubes. These tubes, over 10 feet long, are the largest production klystrons in the world and are used for long range radar.

Four Lindberg Atmosphere Generators are used at Varian Associates to provide dissociated ammonia atmospheres used in the production of microwave tubes. These include units with 1000 cfh, 2000 cfh, and 4000 cfh capacities. Varian also uses five Lindberg Furnaces for various research and production requirements. Lindberg has pioneered in practical equipment for producing all types of atmospheres for the treatment of metals and ceramics. If your product or processes need the application of atmospheres talk it over with Lindberg. Call your Lindberg Field Engineer (see your classified phone book) or write us direct. Gas Process Division, Lindberg Engineering Company, 2491 W. Hubbard St., Chicago 12, Ill.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

LINDBERG heat for industry

Circle 141 on Inquiry Card for more data

News of the MACHINERY INDUSTRIES

July's Net New Machine-Tool Orders Dipped, But Still Bettered Prior 1961 Monthly Average. Seven Month's Figures Show More Orders, Less Shipments, Compared to 1960 Rates

By Charles A. Weinert

M-T Sales Off in July, But Not Unduly So

Following the spurt to $61.5 million in June, new machine tool orders booked in July declined about $5.5 million.

Shipments were down even more —$13.1 million.

New sales, and particularly shipments, were undoubtedly affected by the usual summer drop-off and vacation shut-downs.

Nonetheless, the situation on new orders is much better than that for last year's July. Also, July '61 orders exceeded the average monthly value of orders booked in the first six months of 1961.

Net new orders in July amounted to a preliminary $55.95 million. Last year the July figure was $42.95 million ($13 million less). The average monthly value for the first six months of 1961 is $55.2 million. These figures are for metal-cutting-type and metal-forming-type machine tools combined.

Cutting-machine net new orders in July '61 are valued at $46.75 million—compared to only $33.5 million for July of last year.

Forming-machine net new orders are $9.2 million versus $9.45 million, July '61 compared to July '60.

For the first seven months of 1961, net new orders for both types of machine tools have come in at a little-higher average rate than during 1960. The monthly average so far this year is $55.32 million, compared to $54.43 million per month for all of last year.

Foreign orders continue to represent a very sizable portion of the industry's new business. For the seven months, foreign cutting-machine net new orders total $100.55 million—nearly one-third of all cutting-machine orders. And foreign forming-machine orders total $17.65 million—almost one-quarter of all forming-machine net new orders.

Shipments in July of both types of machines amount to a preliminary $51.1 million. Last year the July figure was $51.3 million.

Shipments during the first seven months of 1961 ran behind last year's monthly rate to the extent of about $1 million. For 1961, the seven-months' average is $53.27 million. For all of last year the monthly average is $54.3 million.

When transmitting these latest figures on machine tool sales and shipments, Ludlow King, executive vice-president of the National Machine Tool Builders' Association, also reported:

"A recent personal survey of the New England machine tool builders gave proof that they are actively engaged in strengthening the industry.

"Some are spending considerable money on research and development to improve the design of their present machine tools.

"Some are acquiring new products to broaden their base of operations.

"Some are stepping up their drive to modernize U. S. production lines.

"Some are making greater efforts to increase their exports.

"An ever-growing number are making arrangements to produce their products in foreign plants to protect their world markets.

"And a number are vigorously pursuing several of these programs.

"The New England builders evinced 'restrained optimism' regarding the last half of 1961 and 1962, although the industry is still operating at about 50 per cent capacity."

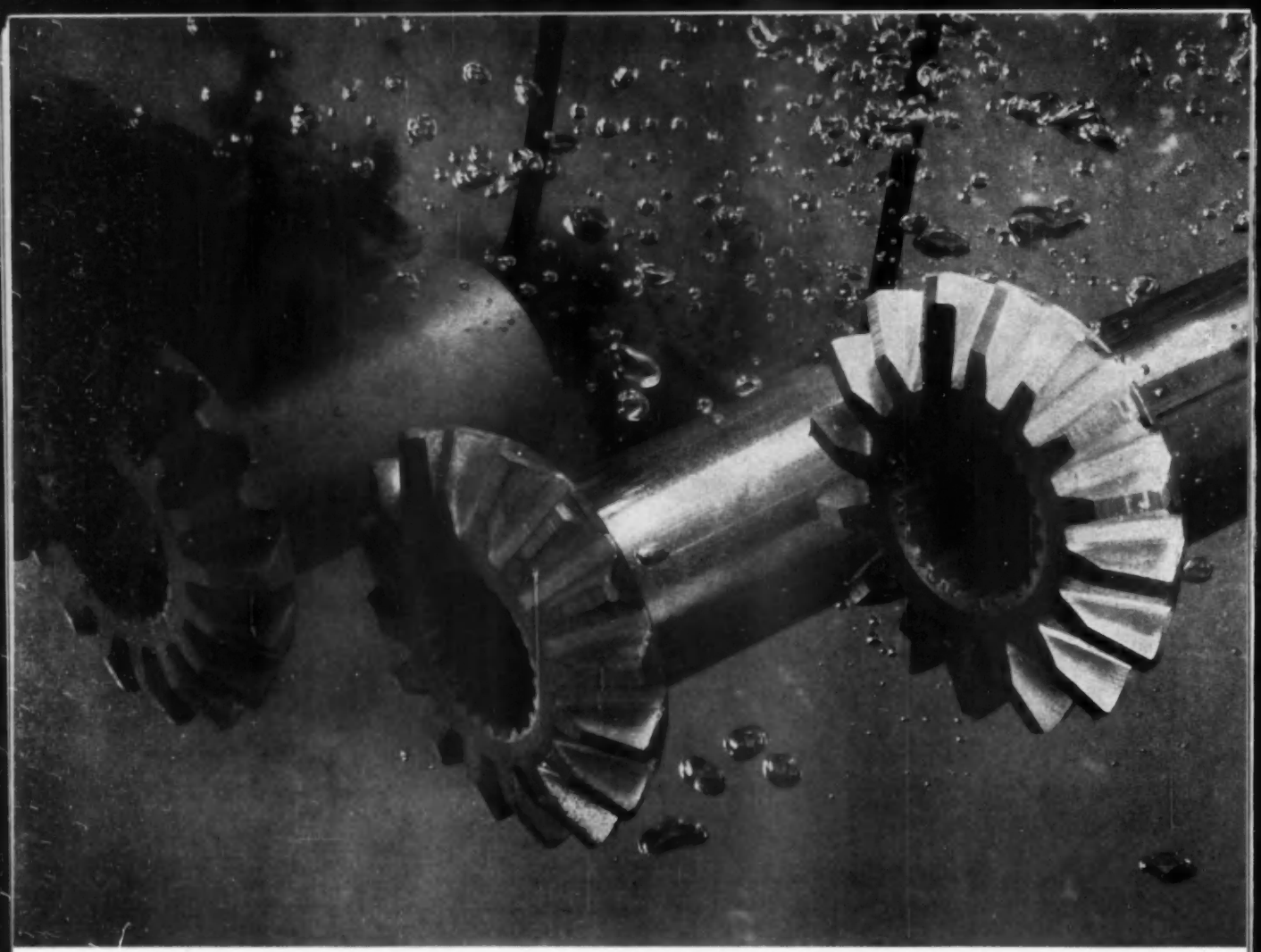
(*Turn to page* 115, *please*)

METAL CUTTING AND FORMING MACHINE TOOLS
Net New Order Receipts, and Shipments
(Millions of Dollars)

	Net New Orders			Shipments		
1961	Cutting	Forming	Totals	Cutting	Forming	Totals
January	$35.75	$20.35	$56.10	$36.95	$8.55	$45.50
February	39.45	6.95	46.40	35.60	10.05	45.65
March	54.90	15.15	70.05	42.05	12.80	54.85
April	41.30	6.35	47.65	40.15	13.55	53.70
May	41.70	7.90	49.60	42.85	15.05	57.90
June	52.10	9.40	61.50	46.75	17.45	64.20
July	46.75*	9.20*	55.95*	38.40*	12.70*	51.10*
7 Months	311.95*	75.30*	387.25*	282.75*	90.15*	372.90*
1961 Avg.	44.56	10.76	55.32	40.39	12.88	53.27
1960 Avg.	41.93	12.50	54.43	42.30	12.00	54.30

* Preliminary.

Source of Statistics: National Machine Tool Builders' Assn.



NEW SAFETY SOLVENT permits

on-the-line cold degreasing . . . 100% parts inspection

FAR GREATER SAFETY than most other chlorinated solvents makes Chlorothene® NU specially inhibited 1,1,1-trichloroethane ideal for the cold removal of greases, waxes, tars, and oils. In cleaning for spot inspection of close tolerances, or for 100% inspection as on broaching machine operations, Chlorothene NU may be used quickly and safely by spray, dip, bucket or wiping methods. Die parts may be cleaned in the shop without having to send them out for vapor degreasing.

By providing answers to both of the chief hazards of common cold-degreasing solvents, Chlorothene NU is leading a breakthrough in solvent cleaning. Having *no* fire or flash point measurable by standard methods, it is removed from the flammable class of cleaning compounds. Maximum allowable vapor concentration of Chlorothene NU solvent is a high 500 ppm, compared to carbon tetrachloride at 25. Chlorothene NU is easily recovered by distillation. It can be used safely on most electric motors, instruments, bearings, and on all common metals including aluminum, zinc, corrosion-prone "white-metal" alloys, and on many plastics.

HYDRAULIC FLUIDS continue to be important objects of research at the Dow Automotive Chemicals Laboratory. They are custom engineered, and Dow's broad background in polyols, glycols, and glycol ethers assures hydraulic fluids of the highest quality, and with an almost limitless range of properties.

VORACEL® foamed-in-place rigid urethane offers new advantages for sound deadening, insulating, "pocket" sealing, and strengthening between structural members. The new process gives a superior, and economically feasible covering and filling material for many automotive uses. For additional information, contact your nearest Dow sales office.

DOW AUTOMOTIVE CHEMICALS LABORATORY

Created expressly to serve the needs of the automotive industry, Dow's Automotive Chemicals Laboratory is active in technical service and development. This laboratory is continually researching and developing coolants, hydraulic fluids, cutting and grinding fluids, function fluids, fuel and lubricant additives, and synthetic lubricants. To see how this laboratory can be of assistance to you, contact your nearest Dow sales office or write Chemicals Merchandising in Midland.

THE DOW CHEMICAL COMPANY DOW Midland, Michigan

INDUSTRY STATISTICS

By Marcus Ainsworth, STATISTICAL EDITOR

WEEKLY U.S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

Make	Weeks Ending Aug. 26	Weeks Ending Aug. 19	Year to Date 1961	Year to Date 1960
PASSENGER CAR PRODUCTION				
Total—American Motors	1,302	.....	218,612	325,153
Chrysler	994	.....	54,763	56,526
DeSoto	.....	.....	.....	16,568
Dodge	382	.....	84,556	276,924
Imperial	116	.....	4,199	8,896
Lancer	499	.....	26,414	7,815
Plymouth	721	.....	103,223	167,930
Valiant	789	.....	70,584	179,079
Total—Chrysler Corp.	3,501	.....	343,741	713,738
Comet	1,779	.....	117,342	116,330
Falcon	6,440	1,119	322,361	334,919
Ford	7,463	4,042	517,710	648,259
Lincoln	435	.....	18,110	13,101
Mercury	751	.....	63,810	101,669
Total—Ford Motor Co.	16,868	5,161	1,039,333	1,214,278
Buick	3,618	1,624	106,657	182,513
Buick Special	1,498	552	52,768	1,462
Cadillac	1,659	603	91,638	109,938
Chevrolet	13,179	99	769,059	1,165,187
Corvair	5,350	246	214,872	170,657
Oldsmobile	4,159	1,914	141,602	256,059
Oldsmobile F-85	1,503	597	38,567	1,310
Pontiac	4,511	2,638	137,108	306,056
Tempest	2,171	1,581	72,509	.....
Total—General Motors Corp.	37,648	10,064	1,624,780	2,195,184
Total—Studebaker-Packard Corp.	2,068	1,702	33,297	70,466
Checker Motors	100	98	3,710	4,824
Total—Passenger Cars	61,487	17,025	3,263,473	4,523,643
TRUCK AND BUS PRODUCTION				
Chevrolet	7,049	4,874	214,562	274,762
G. M. C.	1,525	1,311	43,974	77,317
Diamond T	32	36	1,142	2,004
Divco	60	55	1,539	2,792
Dodge and Fargo	1,524	1,146	42,730	48,968
Ford	5,324	1,172	220,089	243,698
F. W. D.	19	14	576	656
International	2,814	206	93,106	86,113
Mack	247	275	6,647	10,647
Studebaker	155	144	4,218	9,225
White	319	336	11,027	11,697
Willys	2,670	3,064	72,859	91,423
Other Trucks	80	80	2,640	3,253
Total—Trucks	21,818	12,712	715,109	862,539
Buses	54	80	2,420	2,813
Total—Motor Vehicles	83,359	29,817	3,981,002	5,388,995

1961 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

Type of Trailer	June	Six Months 1961	Six Months 1960
Vans			
Insulated and refrigerated	460	2,776	3,313
Steel	32	291	531
Aluminum	428	2,485	2,782
Furniture	181	718	1,417
Steel	110	557	1,261
Aluminum	71	161	156
All other closed-top	1,705	8,546	15,212
Steel	485	1,866	3,496
Aluminum	1,220	6,680	11,716
Open-top	214	1,166	1,617
Steel	123	487	495
Aluminum	91	679	1,122
Total—Vans	2,560	13,296	21,559
Tanks			
Non- and low-pressure			
Petroleum and aircraft refuelers			
Carbon and alloy steel	116	553	871
Stainless steel	14	87	136
Aluminum	123	623	1,022
Total—Petroleum	253	1,263	2,029
Chemical, food, and sanitary	56	316	377
Dry materials	248	895	852
High-pressure (LPG, chemicals, etc.)	21	174	210
Total—Tanks	578	2,638	3,468
Pole, pipe, and logging			
Single axle	17	348	132
Tandem axle	40		528
Total	57	348	660
Platforms			
Racks, livestock, and stake	18	211	249
Grain bodies	77	369	795
Flats, all types	659	2,910	5,274
Total—Platforms	754	3,490	6,318
Low-bed heavy haulers	262	1,418	1,128
Dump trailers	214	589	918
All other trailers	200	1,390	1,887
Total—Complete Trailers	4,625	23,379	35,918
Dump trailer chassis[1]	27	193	380
Trailer chassis only[1]	262	1,338	1,840
Total—Trailers and Chassis	4,914	24,910	38,338
Detachable van bodies[1]	285	1,518	1,730

[1] Sold separately.

NEW PASSENGER CAR REGISTRATIONS BY REGION*

Zone	Region	June 1961	May 1961	June 1960	Six Months 1961	Six Months 1960	Per Cent Change: June over May	June over June 1960	6 Months 1961 over 1960
1	New England	41,655[1]	36,997[1]	38,355	182,536[2]	195,256	+12.59	+ 8.60	− 6.51
2	Middle Atlantic	117,226	119,702	126,787	595,582	665,590	− 1.24	− 7.54	−10.52
3	South Atlantic	72,204	70,630	76,381	392,631	459,358	+ 2.23	− 5.47	−14.46
4	East North Central	133,657	123,723	154,802	652,339	868,986	+ 8.03	−13.66	−24.93
5	East South Central	22,356	20,880	24,803	120,653	157,114	+ 7.07	− 9.87	−23.21
6	West North Central	61,801	46,064	47,425	252,718	278,596	+34.16	+30.31	− 9.29
7	West South Central	38,868	48,537	45,437	230,453	271,795	−19.92	−14.46	−13.71
8	Mountain	16,563	17,857	20,666	102,367	115,847	+ 3.95	−10.18	−11.64
9	Pacific	67,092	62,783	61,208	357,974	398,627	+ 6.86	+ 9.61	−10.20
	Total—United States	573,422	546,173	595,864	2,887,453	3,411,168	+ 4.99	− 3.77	−15.35

[1]—Registrations for Connecticut have been estimated. [2]—Registrations for Connecticut are estimated for April, May and June.

*—Compiled from official state records. Data property of R. L. Polk & Co. May not be copied, sold or reprinted without Polk permission.

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kans., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida. Mont., Nev., N. M., Utah, Wyo. Zone 9—Alas., Cal., H. I., Ore., Wash.

1961 TRUCK FACTORY SALES BY G.V.W.

As reported by the Automobile Manufacturers Association

Period	6,000 lb. and less	6,001-10,000 lb.	10,001-14,000 lb.	14,001-16,000 lb.	16,001-19,500 lb.	19,501-26,000 lb.	26,001-33,000 lb.	Over 33,000 lb.	Total
First Quarter	150,943	43,699	2,631	6,988	31,468	14,856	5,768	7,416	263,769
April	53,134	14,877	836	2,707	11,449	4,937	2,538	3,380	93,858
May	57,791	15,177	1,002	2,331	13,246	5,987	2,679	3,193	101,406
June	67,419	14,735	1,354	2,960	14,891	6,390	2,717	3,358	113,824
Second Quarter	178,344	44,789	3,192	7,998	39,586	17,314	7,934	9,931	309,088
Total—Six Months—1961	329,287	88,488	5,823	14,986	71,054	32,170	13,702	17,347	572,857
Total—Six Months—1960	393,390	106,575	6,799	19,236	101,772	41,368	21,492	20,320	712,952

This Michigan Tractor Shovel operates on hillsides and 30° slopes ...get stopping power with Hi-Torque brakes

Working on a Springfield, Mass., reservoir job, the Fruin-Colnon Contracting Company and C & C Construction Co. use this 6 yard Tractor Shovel for clearing, stripping, excavating, lugging 16-ton pipe sections, backfilling, and other work. The contractor reports: "These operations call for good brakes which this machine has ... BFG Hi-Torques are tops!"

Hi-Torque brakes are now supplied as original equipment on a wide range of heavy-weight vehicles: big dump trucks, tractor-scrapers, coal haulers, mine trucks, and other special vehicles. They provide up to 125,000 foot pounds of braking torque per brake in a smaller sized "package" than any other shoe brakes. Hi-Torque brakes cut stopping distance approximately in half, compared to conventional two-shoe brakes tested on identical vehicles and loads.

You can use these brakes in *your* heavy-duty vehicles with a minimum of design change. Available in seven basic sizes; operation air-over-hydraulic, or direct hydraulic. For complete information call or write *B.F.Goodrich Aerospace & Defense Products, a division of The B.F.Goodrich Company, Dept. AI-9, Troy, Ohio.*

Hi-Torque brakes give *full-circle contact* around the drum for maximum stopping power. Brakes can be operated by air-over-hydraulic, direct-hydraulic, or direct-high pressure air actuation.

B.F.Goodrich **Hi-Torque brakes**

Circle 143 on Inquiry Card for more data

NEW PRODUCTION and PLANT EQUIPMENT

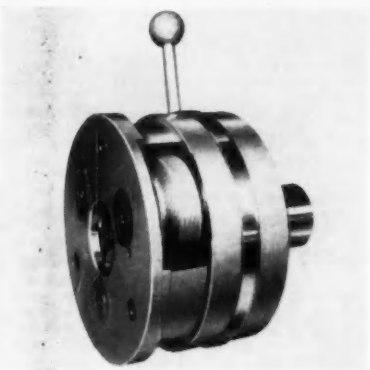
By C. J. Kelly
ASSISTANT EDITOR

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

Thread Rolling Head

THREAD rolling operations can be performed with new thread rolling heads which range from 1¼ to 2 in. in both UNF and UNC, right hand and left hand. The new head is available in both stationary and revolving models.

The revolving model is for application to threading machines and automatic screw machines using a revolving tool, while the stationary head is designed for turret lathes, hand screw and automatic screw machines using a stationary tool. Both styles are self-



opening in operation. The stationary type is opened by interrupting the forward travel of the turret or carriage, while the revolving head is opened by interrupting the forward travel of the yoke.

The stationary head is closed by a reset handle. The revolving head is closed by a yoke. *Landis Machine Co.*

Circle 40 on Inquiry Card for more data

Heavy-Duty Lift Truck

A NEW line of heavy-duty 10,000 and 12,000-pound capacity electric-powered fork trucks — designed the "Spartan" F-52T series—has been introduced.

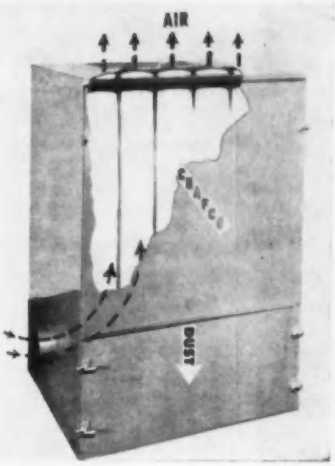
The new sit-down type electric trucks are engineered to provide good maneuverability and stamina while handling heavy loads. The drive axle, trail axle, frame and other major components of both models are designed to handle 12,000 lb loads; only minor modifications are made when the truck rating is reduced to 10,000-pound capacity. This provides capacity to spare.

Designed for 36, 48, or 60 V power supply, the large compartment will

accommodate a 1280 AH battery, sufficient for a full-eight-hour operating shift. Automotive-type controls produce controlled acceleration through four forward speeds and four reverse speeds with no plugging. *Elwell-Parker Electric Co.*

Circle 41 on Inquiry Card for more data

Dust Collector

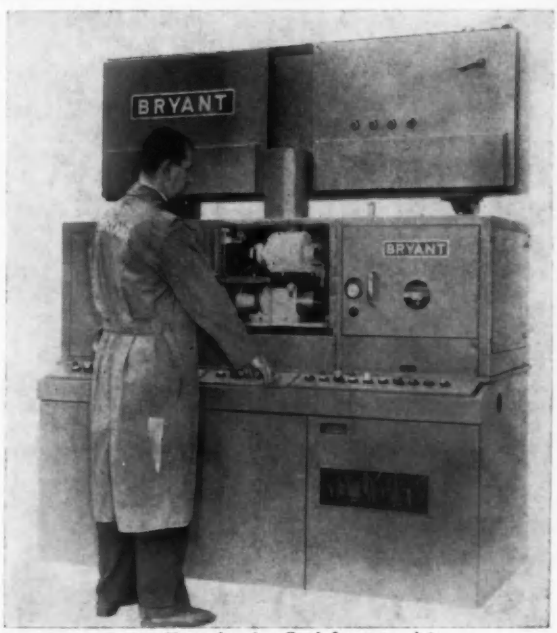


Dust collector model A-6 has a capacity of 1540 CFM at 6250 linear ft per minute. The unit is equipped with two inlet ducts and usually can handle two machines simultaneously. Overall size of this model is 28 by 33 by 48 in. high. Chicago Air Filter Co.

Circle 42 on Inquiry Card for more data

Double-End Internal Grinding Machine

Workparts such as Diesel nozzles can be ground at high production rates, with good concentricity, fine surface finishes and precision accuracy on this new grinder. This unit is specifically designed for grinding both a straight and tapered bore at a single chucking of a workpiece. Two opposed wheel slides and a rotary indexing worktable carrying two workheads permit two workparts to be ground simultaneously. A rotary indexing worktable, supporting two workheads, is centered between straight bore and taper bore grinding units. Units may be operated simultaneously or individually, as desired. Machine operation is completely automatic. Operator needs only load and unload. Bryant Chucking Grinder Co.



Circle 43 on Inquiry Card for more data

(Turn to page 97, please)

What synthetic sealing materials should I use—and when

Environmental conditions generally dictate the type of synthetic rubber for a specific oil sealing application.

Where temperature, shaft speed, runout, eccentricity, and lubricant type are "normal", standard Buna N synthetic rubber compounds are satisfactory. If, however, the application is "dry running", a compound must be selected that will operate satisfactorily with a very small amount of lubricant. If the application involves excessive abrasion, highly "loaded" compound stocks should be provided. At temperatures over 250° F polyacrylics or silicone compounds are indicated; if high temperature is accompanied by a solvent base or additive lubricant, polyacrylics are definitely preferred.

Thus many variables govern successful oil sealing. The chart below gives more data; for complete information from the world's foremost oil seal laboratories, call your National Seal engineer. He's in the Yellow Pages, under Oil Seals or O-Rings.

SYNTHETIC RUBBER COMPOUNDS — **RECOMMENDED APPLICATIONS**

Comp. No.	Base Polymer	Min/Max Operating Temperature	Life Index	Price Index	Automatic Transmissions	Pinions	Axle Seals	Engine Seals	Misc. Applications
B-63	Buna N	—40°F/225°F	100	100				Excellent for small gas engines.	Excellent for small non-spring loaded seals.
B-86	Buna N	—30°F/225°F	100	100		Satisfactory for medium temperature applications.	Truck and automotive rear axles. General use.	Satisfactory as general purpose material where temperature permits.	General purpose Buna N applications.
B-94	Buna N	—60°F/250°F	100	100					Excellent against aromatics and some military aircraft oils, fuels.
B-95	Buna N	—30°F/225°F	100	100					Good dry running compounds for applications requiring high durometer stock.
C-6	Buna N	—30°F/225°F	100	100			Excellent for semi-rough axles. Has good wear qualities.		Good for pressure seals due to high durometer and clean trimming.
L-28	Acrylon BA-12	—30°F/300°F	400	125	Good for temperature range indicated.	Satisfactory in single lip construction.	Sealed bearing high temperature applications.	Satisfactory for automotive use. High temperatures.	Satisfactory for high temperature general applications. Can be used with EP or GL-4 oils.
L-34	Hycar PA-21	0°F/300°F	400	115	Good for temperature range indicated.	Dual lip limited contact for high temperatures.	Sealed bearing high temperature applications.	Satisfactory for automotive use. High temperatures.	Satisfactory for high temperature general single or dual lips. Ok with EP or GL-4 oils.
S-48	Silicone*	—80°F/400°F	1500	150	Excellent high and low temperature life.	Silicone Compounds Not Recommended With EP Lubricants at high temperatures.		Excellent for general engine use. Suggested for premium gasoline and Diesel engines.	Excellent wide range material. Avoid use in EP and GL-4 oils.
S-49	Silicone*	—80°F/300°F	600	130	Good at high and low temperatures.			Very good for general engine use; premium gasoline and Diesel engines.	Very good wide range material. Avoid use in EP and GL-4 oils.

*Silicones require special stabilization for satisfactory use in aromatic oils at high temperatures.

NATIONAL SEAL
Division, Federal-Mogul-Bower Bearings, Inc.
GENERAL OFFICES: Redwood City, California
PLANTS: Van Wert, Ohio; Redwood City and Downey, California

Circle 144 on Inquiry Card for more data

Circle 145 on Inquiry Card for more data →

Ingersoll CROSS-ROLLED Clutch Steel Helps Move the Earth

To meet the punishing demands of off-highway equipment, Ingersoll Steel Division melts, CROSS-ROLLS, and processes to customer specifications, special analysis clutch steel. In short, Ingersoll can:

- **Melt (electric furnace) steels to special analyses**
- **CROSS-ROLL ingots to sheet and light plate**
- **Blank or shear**
- **Produce rings with internal or external teeth**
- **Rough and/or finish grind the surfaces**

Ingersoll clutch steel is also widely used in the automotive and tractor industries.

Write for Ingersoll's new full-color facilities and products brochure: "Experts in Specialty Steels."

Ingersoll's gear shapers, hobbing machines and surface grinders produce precisely finished clutch plates to customer specifications.

INGERSOLL B-W STEEL

Ingersoll STEEL DIVISION

Borg-Warner Corporation

NEW CASTLE, INDIANA

TOP PISTON POWER FOR DIESEL ENGINES

BOND LOC

STOPS GROOVE WEAR

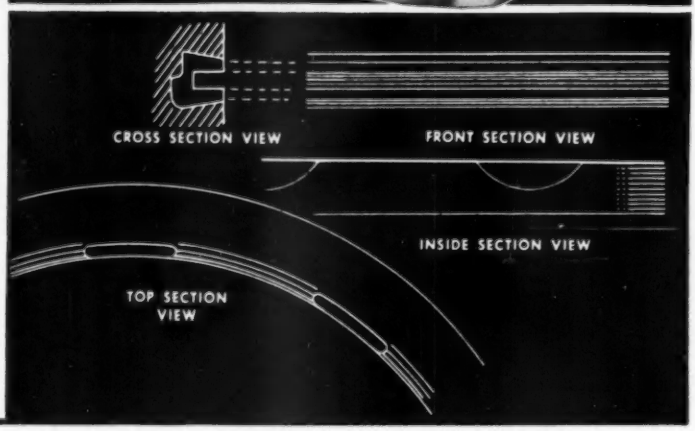
"NI-RESIST" IRON
TOP RING SECTION

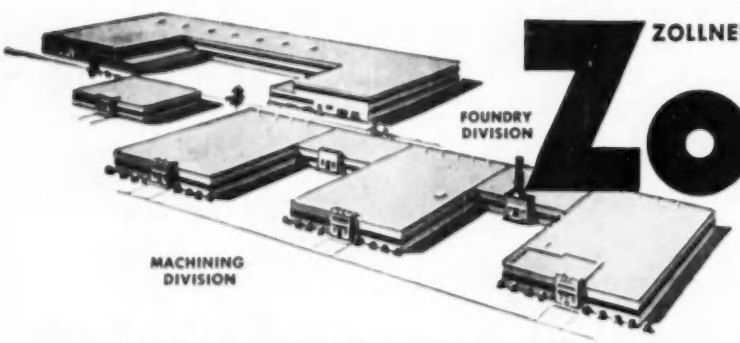
Double Bonded

PERMANENTLY
METALLURGICALLY—Al-Fin Process
MECHANICALLY—Zollner Lock

EXCLUSIVE ADVANTAGES OF ZOLLNER DESIGNED MECHANICAL LOCK

1. Reverse angle designed top ring section with tapered flutes, dovetail locks in all directions
2. Positive mechanical interlock prevents any movement
3. Reduces weight 25% to 30% with lower inertia stresses
4. Increases surface areas carrying inertia load





ZOLLNER CORPORATION • FORT WAYNE, IND.

ZOLLNER

HEAVY DUTY PISTONS

COMPLETE CO-OPERATION IN ENGINE DEVELOPMENT WITH THE FINEST PISTON FACILITIES

Circle 146 on Inquiry Card for more data

Circle 147 on Inquiry Card for more data →

Quality... the best economy of all

Another product of Sunoco research . . . a fire-resistant hydraulic fluid

The flame test, above, dramatizes the effectiveness of Sun's new fire-resistant hydraulic fluid. The wick in the conventional fluid burns readily; the wick in Sun's new fluid just can't be lighted.

SUNSAFE, a water-in-oil emulsion, eliminates fire hazards . . . provides increased safety to personnel and equipment. At the same time, operators get the essential performance characteristics of a top-grade hydraulic oil—low rates of wear, long service life, and protection against rust and corrosion.

This combination of *quality* in engineering know-how, and *quality* in product, proves once again that *quality* in any sense is the best economy of all.

For 73 years Sunoco has meant quality right down the line. Today, this quality is found in more than 400 Sunoco industrial products. SUN OIL COMPANY, Phila. 3, Pa., Dept. I-14.

In Canada: Sun Oil Company Limited, Toronto and Montreal.

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

SUNOCO®

PRINTED IN U.S.A.

MICRO-PRECISION DIVISION, MICROMATIC HONE CORPORATION

PLASTIC BEARING OUTWEARS METAL

Loads as high as 20,000 psi don't bother this plastic bearing.

In severe high-load, low-speed tests, it came through without failure.

What makes it so rugged?

This material is a glass-reinforced phenolic molding compound called Durez 16771. Here it surrounds the Teflon* bearing surface. It acts as a keying agent to keep the bearing surface material in place under heavy loads. It also helps bond a metal shell that encloses the finished bearing.

Besides being strong and tough, Durez 16771 withstands oil, grease, and acid; can't pit, rust, or corrode. Parts made from it seldom need machining—come out of the mold ready for assembly.

What can you do with an idea-plastic like this? Automotive designers are putting it to work now in oil-pump gears, automatic transmission parts, oil-seal rings, suspension ball joints. Check into the places where a tough, high-impact plastic could do a better job than the material you're using, or could help you cut production costs. Then ask your molder for more details on Durez 16771—or write us for Bulletin D203, which describes the material and its capabilities.

*Teflon is the Du Pont trade name for TFE-Fluorocarbon

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 8209 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Circle 148 on Inquiry Card for more data

NEW PRODUCTION and PLANT EQUIPMENT

(*Continued from page* 91)

12 Inch Height Gage

THE main feature of a newly introduced height gage is its ability to measure diameters as small as 0.250 in., with accuracies to 0.00005 in. Any dimension may be set in increments of 0.0001 in. from ¼ to 12 in.

A spring loaded non-rotating measuring column is made up of a series of 0.250 and 0.750 in. spacers lapped to gage block accuracy. Since the 0.250 spacers are lapped flat and parallel, the inspector can take readings from either the top or bottom side of the spacers.

Due to spring loaded construction of the measuring column, all chance of backlash is eliminated because the pressure in the measuring column is equal at either end of the 1.000 in. travel of the micrometer screw.

The manufacturer states that accessories are available for the 12 in. HYT size gage as follows: 3 and 6 in. riser blocks, and 18 and 24 in. transfer stands. *Van Keuren Co.*

Circle 47 on Inquiry Card for more data

Compact Gas Generator

A NEW industrial gas generator is guaranteed to maintain 99.99 pct dissociation efficiency, with 200 chf capacity, and requires only 15 sq in. of floor space.

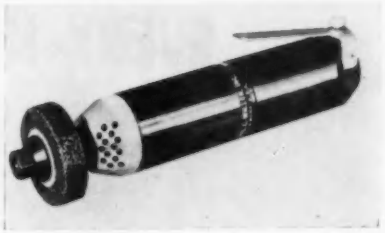
New developments incorporated in the generator to assure its high efficiency are: The use of a tubular Inconel free-flow retort, permanent nickel-type catalyst, and long-life 80-20 alloy heating elements fully supported and completely encircling the retort. The use of refractory and slab-type insulation reduces heat loss and maintains an unusually high thermal efficiency.

At full output, the power load (220 v, 1 phase) is less than 4 KW. The output rate is completely flexible and a flow-meter valve accurately controls flow rates anywhere within the generator's rating. The unit is fully wired and piped, requiring only power and ammonia supplies. *Lindberg Engineering Co.*

Circle 48 on Inquiry Card for more data

Small-Wheel Grinders

SMALL wheel grinders with governors have been designed for developing maximum power at controlled speeds on tough grinding jobs. The new models are of the spindle and collet-chuck types with lever or pushbutton throttles and governed speeds of 12,000, 15,000, and 18,000 rpm.



Both models in the new series, designated 921, are available with a wide variety of adapters to accommodate small grinding wheels, rotary files, carbide burrs and cutting discs. *Thomas C. Wilson, Inc.*

Circle 49 on Inquiry Card for more data

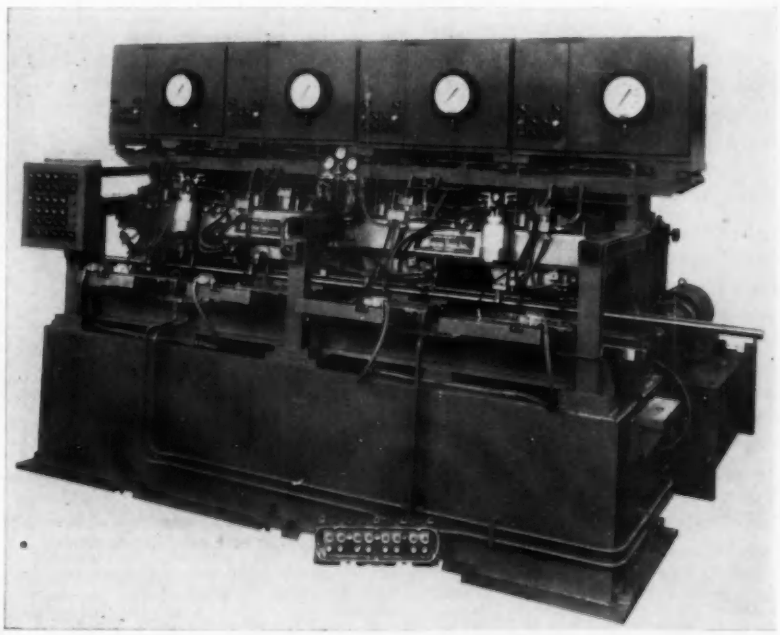
New Concept in Transfer Type Leak Testing

A new concept in transfer type air leak test machines has been developed. The new machine was developed to test cylinder heads, either four or six cylinder, but may be modified to accept other similar parts. The part is slid into the fixture and hydraulically clamped. The automatic cycle then takes over by injecting a measured amount of air under pressure into the part being tested. Should the part prove defective, it will show on the dial, and a red light will appear. Should the part prove acceptable, a green light will appear which actuates a valve that releases a quantity of paint for marking.

Selector switches are provided to test out leak test panels. The machine is also equipped with memory switches or counters, so that in the event of five consecutive bad parts, the machine automatically shuts down so the operator may check if the machine is functioning properly, or if the castings contain manufacturing defects. *Turner Bros., Inc.*

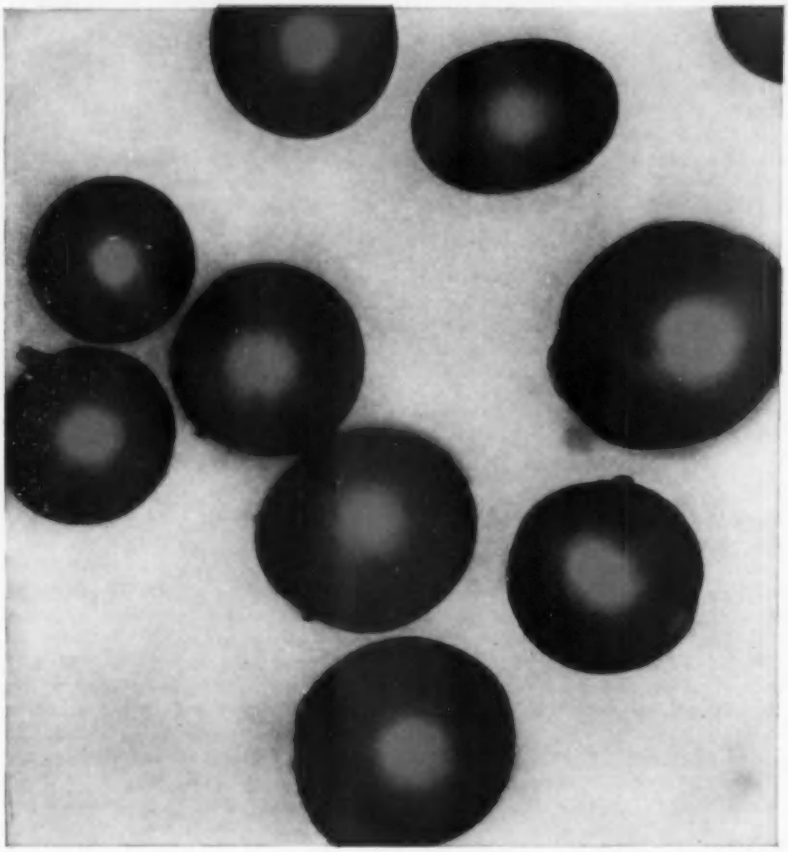
Circle 50 on Inquiry Card for more data

(*Turn to page* 99, *please*)



The machine tests two parts at one time, for a total of 250 pieces per hour. The overall size of the machine is 8 ft. long, 7 ft. wide, and 8 ft. high, and weighs 5 tons.

30 MILLION OF THESE JET-FORMED SPHERES IN EVERY INCH OF BEARING SURFACE!



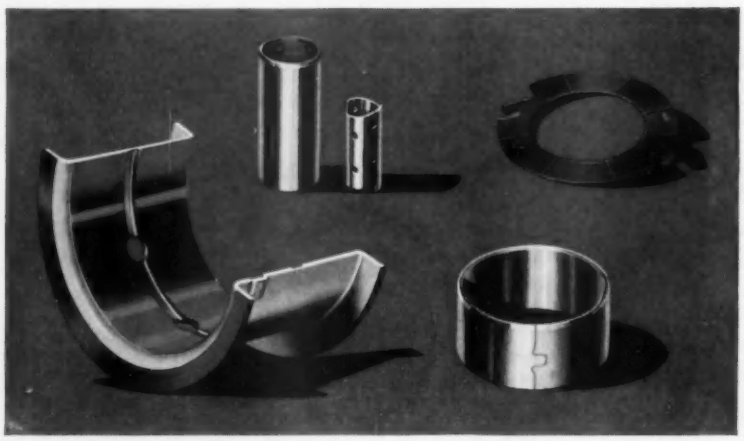
JET PROCESS BLASTS MOLTEN ALLOY INTO UNIFORM PARTICLES . . . so small that thirty million will form a thin layer only one inch square! This sintered layer is the bearing surface of Federal-Mogul sleeve bearings.

Molten copper-lead, alloyed to exact specifications, is poured into a special inert-atmosphere reaction crucible. Here it's blasted by a high-speed fluid jet to form the dense powder shown at left.

Because of the uniform particle size of this powder, the bearing surface of each F-M copper-lead sleeve bearing has precisely the same alloy composition and high adhesion to the steel backing as every other F-M bearing of the same alloy type!

YOU CAN SEE THE CONSISTENT SIZE in the photomicrograph. What you *can't* see is the consistent alloy composition which produces uniform bearing properties and performance in any alloy type.

Federal-Mogul makes engine bearings for every condition of speed and load. You can select from among five different sintered copper-lead alloys, all permanently bonded to precision-formed steel backing. Our Engineering Department is available to you for consultation or recommendations on bearing design and application. For more information, write Federal-Mogul Division, 11037 Shoemaker, Detroit 13, Michigan.



A COMPLETE LINE! Steel backed bearings with a selection of many different alloys for virtually any bearing application—Plain and bimetal bushings in bronze, steel or aluminum. Precision thrust washers in solid bronze, or sintered alloys on steel (one or both faces). Rolled split spacer tubes in steel, aluminum or stainless. •

FEDERAL-MOGUL

sleeve bearings
bushings-spacers
thrust washers

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.

NEW PRODUCTION and PLANT EQUIPMENT

(*Continued from page 97*)

Coolant Supply Units

Two new tank and pump units for supplying coolant to machine tools have been introduced. The tanks have 16 and 32 gallon capacities with two baffles for aid in settling chips and sludge.

The body and cover are of welded steel construction and swivel casters or welded steel legs are optional. The tanks are equipped with ⅛ hp

centrifugal pumps which circulates a copious flow of water soluble coolant or cutting oil up to 300 SSU viscosity.

Volumes of 20 gpm at 7 ft head or 10 gpm at 14 ft head are available from this pump unit. Pump motors are available for standard electric ratings. *Brown and Sharpe Mfg. Co.*

Circle 52 on Inquiry Card for more data

Welding Power Pack

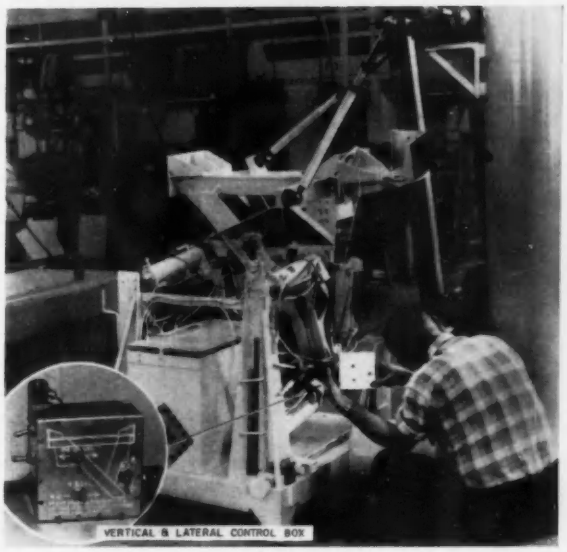
MULTIPLE spot welding can be performed by utilizing a new power pack designed for high production output of small weldments. Composed of two or more dependent high output water-cooled transformers, the compact unit offers single cycle operation of one or more spots in rapid sequence.

According to the manufacturer, this power pack (Model 60-T) is especially suited for high output automatic feed units. The air actuated timing controls have 100 amp. contactors and can operate the transformers in single sequence or in pairs. The build-up of welding tip pressure triggers the first timer, which in turn triggers the second one, and so on. Power supply required is 220-250 volts, 60 cycle, single phase; maximum output is 10 KVA per transformer. There's a heavy duty aluminum front panel for mounting welding heads and which is the transformer secondary ground return. The 20 by 20 by 20 in. housing is louvered 12-gauge reinforced steel. *Ampower Products.*

Circle 53 on Inquiry Card for more data

Hydraulic Positioners for Precision Locating

Hydraulic positioners, developed for the aircraft industry, are capable of locating a 2000 lb jig component with hairline accuracy. According to the manufacturer the new devices are reducing fixture setting time by 80 pct. The positioners have been under development for three years. The remotely controlled devices rely chiefly upon six hydraulic cylinders to guide jig components weighing up to 2000 lb into exact position. Vertical, lateral and lineal displacement, and vertical, horizontal and axial rotations are the six areas of movement covered by the new tool. Lockheed Aircraft, California Div.



Circle 54 on Inquiry Card for more data

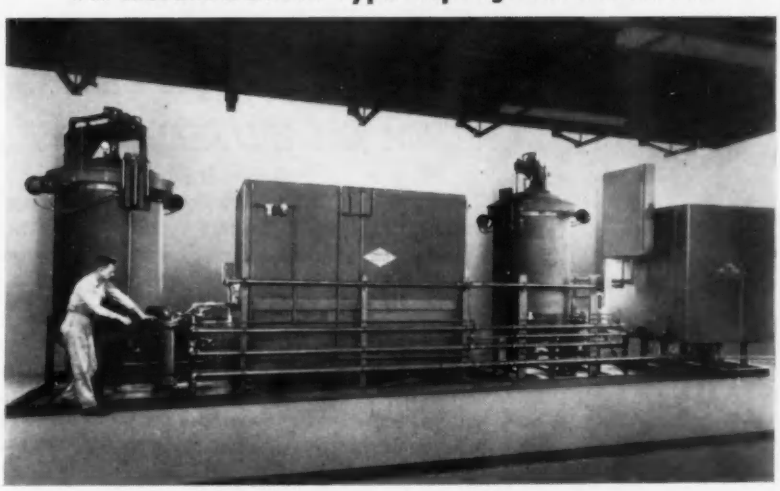
Compressed Air Vacuum

COMPRESSED air operates a new vacuum designed for industrial cleaning jobs. The new unit, specially adapted to liquid "pick-up" jobs, is suitable for cleaning out sumps, pits and spills. It will take over 55 gallons in 55 seconds, according to the manufacturer.

The unit has no electric motor or moving parts and can be used for dry cleaning walls and such by use of a special attachment. The lid assembly is designed to shift from full to empty drums in seconds. A mechanical shutoff stops the flow of liquid when the drum reaches the proper level. *American Cleaning Equipment Corp.*

Circle 55 on Inquiry Card for more data

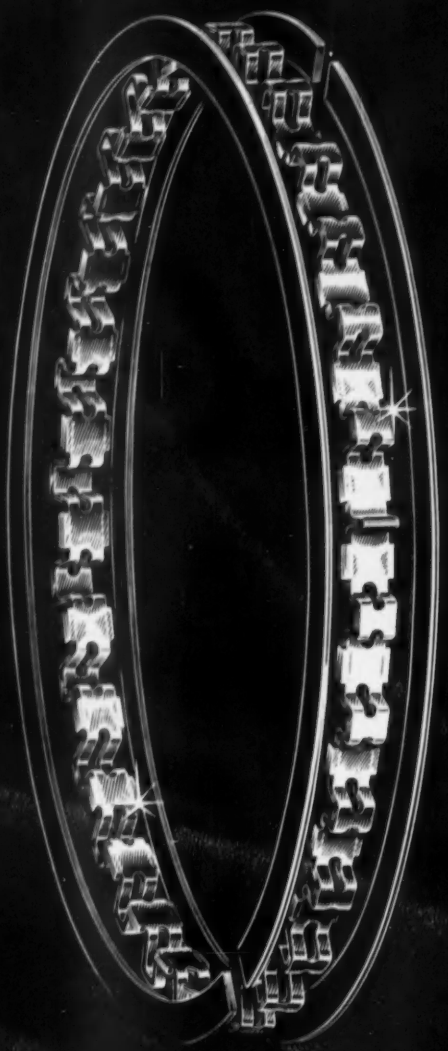
Pit-Installed Batch-Type Impregnation Machine



A new dual autoclave batch-type impregnation machine utilizes a single steam jet to provide vacuum for both autoclaves. This design, according to the manufacturer, reduces initial equipment costs and achieves operating economies. The machine is intended for use in sealing cast aluminum automotive transmission cases with a metal oxide type sealant. This new unit consists basically of two autoclaves (680 gal working capacity each), a sealant supply tank (2100 gal), a hot inhibitor rinse tank (1600 gal) and a cold water rinse tank (1600 gal). Prenco Products, Inc.

Circle 56 on Inquiry Card for more data

80,000,000 cylinders can't be wrong!



U. S. Pat. No. 2,789,872

Sealed Power Stainless Steel Oil Rings

CONTROL OIL BETTER... GIVE LASTING ECONOMY!

That's why manufacturers who build more than 85% of all U. S. cars specify Sealed Power-designed Stainless Steel oil rings for their new cars—and for service.

More than 80,000,000 Stainless Steel oil rings have been factory installed.

Sealed Power's patented, *proven* design, combined with superior Stainless Steel, side seals, licks the oil control problem in high compression, high vacuum engines.

Stainless Steel retains tension at high operating temperatures. Stainless Steel resists pitting and etching of gases, greatly reduces carbon build-up so that return oil vents remain open permitting the free return of oil to the crankcase.

Unique end-abutment design of Sealed Power Stainless Steel oil rings ends groove depth problems; rings have proper tension regardless of contact with bottom of groove.

Chrome-plated side rails seat instantly. And installation's a snap!

Progress through profits

Sealed Power Preferred Performance

PISTONS • PISTON RINGS • SLEEVES • SLEEVE ASSEMBLIES • PRECISION CASTINGS • SEALING RINGS FOR ALL APPLICATIONS

SEALED POWER CORPORATION, MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA • STRATFORD, ONTARIO • DETROIT OFFICE • 17600 WEST 8 MILE ROAD, PHONE 357-4141

NEW PRODUCTS AUTOMOTIVE-AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

Masonry Protection

Longlife is the name given a new formulation for protecting and preserving masonry—old or new, inside or out—from exposure. The first coat of the new material penetrates the surface to which it is applied and becomes a part of it. The second application becomes an integral part of the first coat and forms an elastic film over the surface. The elasticity allows the coating to give with expansion, contraction, building movement and settlement, the manufacturer reports. *Flexrock Co.*

Circle 70 on Inquiry Card for more data

Cryogenic Valves

Hardened seats for longer life are featured in miniature cryogenic valves designed for the missile industry. The valves range from 100 psi to 4000 psi in capacity, and operate dependably in a temperature

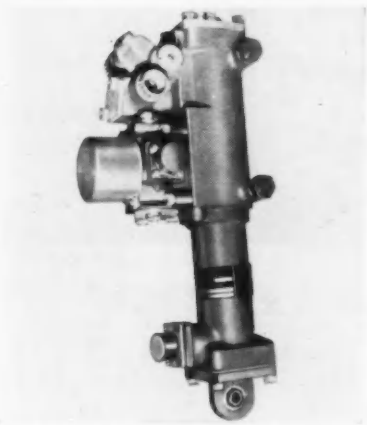
range from —425F to +300 deg F.

According to the manufacturer, the extremely low degree of internal leakage is an advancement in design of cryogenic valves. Functional tests using 1000 actuations at various temperatures showed zero leakage in the 70 deg F range with leakage low as 0.5cc. at — 300 deg F at 3000 psi. *Hydraulic Research and Mfg. Co.*

Circle 71 on Inquiry Card for more data

Servo Actuator

A servo unit has actuator, servo valve, and position transducer integrated into a single compact system. The unit was designed and produced originally for the first stage of a high production solid rocket engine. It is ideal where expendable type units are desired. Application possibilities in-



clude testing for rocket nozzles, gimballing of small rocket engines, laboratory usage or wherever precision positioning is required either ground support or airborne. The actuator functions in systems to 3000 psi and has a piston velocity at 1000 lb load of 15 in. per second. Stroke is 3.2 in. *Hydraulic Research and Mfg. Co.*

Circle 72 on Inquiry Card for more data

Self-Clinching Nuts

Small lightweight nuts have been designed for installation in sheets of 0.040 in. thick and up. The nut is self-locking, with high push-out and torque values. After installation the nut is flush on the reverse side of the sheet.

The nuts are suitable for use in temperatures up to 800 deg F, and for use in materials with Rockwell hardness B-75 or less. Available sizes are from number 4 to 10. *Penn Engineering and Mfg. Corp.*

Circle 73 on Inquiry Card for more data

Filter Mask

A new featherweight filter mask has been designed for use in areas where maximum filtration is required. This filter will conform to any type face and allows easy breathing, unmuffled conversation and unobstructed vision, the manufacturer reported.

The mask, made of a non-woven fabric which provides a large filter area, is shaped to stay away from the nose and mouth. An elastic headband seals the single unit mask around the edges and a flexible metal nosepiece adjusts to finger tip pressure. Nine of the masks weigh less than an ounce. *Minnesota Mining and Manufacturing Co.*

Circle 74 on Inquiry Card for more data

Divider-Combiner Valve

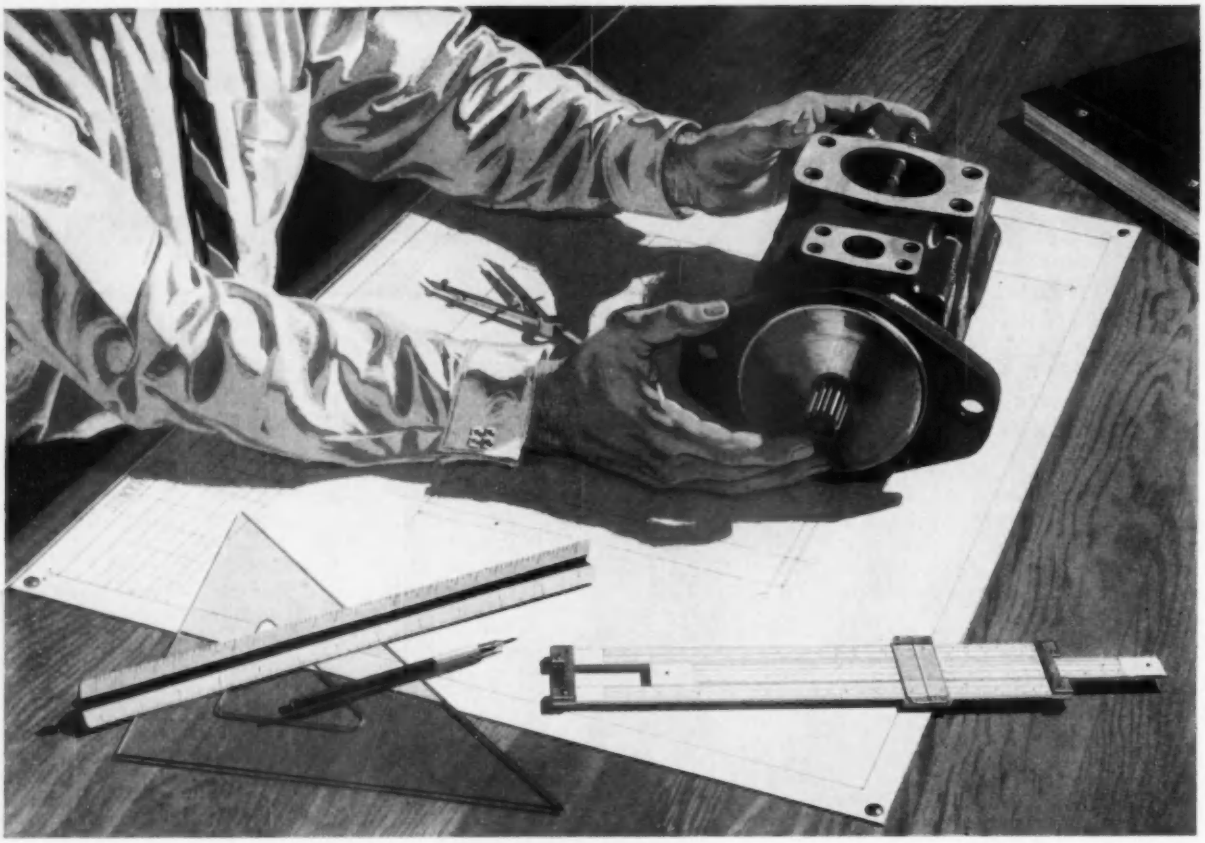
For use where two hydraulic actuators are required to operate in unison, model 1467 flow divider-combiner has been introduced.

When used as a divider, the new valve divides pump output (up to 40 gpm) into two equal flows, for the simultaneous operation of two cylinders, for example.

As a combiner, this device equalizes the return flows of two cylinders to equalize piston speeds. Besides equal division or combining, the unit may be ordered factory-calibrated to any unequal combination, such as 40-60 pct, 44-55 pct, etc.

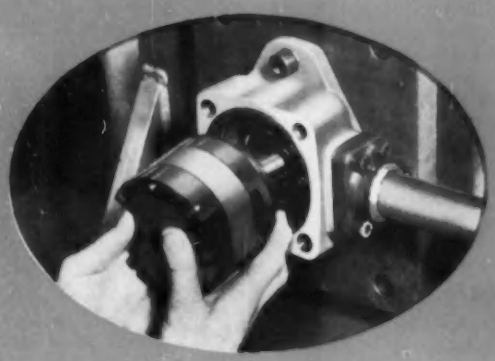
One or both of the divided flows may be redivided with additional valves to synchronize multiple elements. *Waterman Hydraulics Corp.*

Circle 75 on Inquiry Card for more data



IF YOU BUILD MOBILE EQUIPMENT...

VICKERS WILL MATCH A PUMP TO YOUR APPLICATION



10 minute field repair

Typical of the advanced design features available on Vickers pumps is the replaceable pumping cartridge in the "High Performance" series. A complete overhaul: cover removal, cartridge replacement, and cover replacement takes just 10 minutes in the field–no critical fitting or adjusting!

Customized designs or standard models–both are available from Vickers. Industry's broadest line of mobile pumps allows you to select the design that's best for you . . . saves you from paying for "too much" pump and from getting "too little".

Our application engineers can help you match your specifications with one of several thousand standard combinations of single or double pumps with choices of shafts, mountings, port connections, deliveries and direction of rotation. However, when unusual requirements demand special approaches, Vickers unequaled Research and Development facilities are at your service.

Whichever type of pump you select, wherever your equipment goes, there is the additional advantage of complete interchangeability of parts built in any Vickers plant located throughout the free world, providing full service coverage.

Additional data on pumps for mobile applications is available from your Vickers application engineer or by writing to address below. Ask for Bulletin P1.

VICKERS®

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
Mobile Hydraulics Division
ADMINISTRATIVE AND ENGINEERING CENTER
DETROIT 32, MICHIGAN

9461

Circle 152 on Inquiry Card for more data

Observations

By Joseph Geschelin

Small Cars

Looking at the figures for registrations of foreign cars for the first five months of 1961 we find the totals are less than half of those reported for the same period of 1960. If this trend persists for the rest of the current year, we hope it means that the selection of small wheelbase cars provided by domestic producers has finally begun to satisfy the cravings of our public. The significant fact, however, is that although the public seems to want the small cars, the greater demand is for deluxe models such as Monza and Cutlass and other names too numerous to mention. The public wants small cars but it wants, at the same time, luxury features that cost a lot of money. So maybe price is not the sole criterion after all.

Compact Controls

Ford Motor's manufacturing engineering department reported at the Westinghouse Forum early this year that some experimental electrical control panels for transfer machines were reduced in size by at least 40 per cent through the use of small relays. These are not the plug-in miniaturized relays that have been tried by other manufacturers. We have learned more recently that the compacted panels have been installed on several rebuilt machines for Cleveland Engine Plant 1. Presumably, if these panels work out well in actual use they will be the forerunners of other installations at Ford.

Clear Dates

For several years the directors of public relations for vehicle manufacturers have made it a practice to clear preview and meeting dates with the AMA office in Detroit. This year, particularly, this has paid off. For we have three solid weeks of previews, day by day, without an interference and without overlapping. We mention this for the benefit of large suppliers and major parts makers who have occasion to round up the Detroit press group for special press conferences. During the past year we have found a number of interferences in dates, an embarrassing situation to us since we should like to attend them all. We make the suggestion that if the large suppliers will check with AMA and file their dates in advance, it will promote better attendance and prevent interferences.

Outboard Motors

Cleveland Graphite Bronze is developing a unique ignition system for outboard motors. In conjunction with this, experimental work is under way to seek ways of plating all bearing and rubbing surfaces so as to eliminate the need for lubrication. If this can be done, the outboard can operate on white gasoline without lube addition. This approach, if successful, should go far to eliminate the troubles encountered in the operation of outboard motors and will reduce the troubles with spark plugs.

Parts Makers

We had the pleasure this summer of visiting two new research centers, both placed in operation by leading parts makers. One of these was the Center at Sealed Power in Muskegon, the other introduced by Eaton Mfg. Here are the most advanced facilities for research in various specialties, fitted with specialized equipment and scientific instrumentation. These facilities vie with anything to be found in our industry. This development supplies further evidence of the research and engineering effort expended by parts makers in serving the vehicle producers. It should be of particular significance in the light of the reliability projects now in effect throughout the industry.

Rand Gun

A fiber-resin depositor, the Rand gun, is being groomed on a license basis for producing reinforced plastic parts by the sprayup method. Made by the Rand Development Corp., the Depositor consists of a rotary roving cutter and a pair of symmetrically mounted resin spray guns. It employs the most inexpensive glass roving. The process is so simple and economical that its promoters visualize replacement of the familiar lay-up technique as well as other methods of producing Fiberglass parts of any size and configuration.

Vertical Turners

Despite the current situation among machine tool builders, Motch & Merryweather is enjoying a boom in orders for its new line of vertical turners. What they have, essentially, is a basic vertical truning machine, produced from standardized elements for the major components. These elements, in turn, can be employed in the making of single purpose machines with one or more columns, with simple or compound slides, and with all manner of attachments. Machines already in use in the automotive plants have been designed for machining flywheels, pistons, cylinder barrels, and a variety of other parts of any degree of complexity. ■

Fluorocarbons in the Automotive Industries

(*Continued from page* 79)

the resin is forced through the die, the lubricant volatilized and the product sintered and cooled.

This technique yields higher production speeds and makes possible the fabrication of thin-wall forms.

Thoroughly impregnated and coated articles can be produced by spraying or dip-coating with a dispersion of TFE. This solution contains 59-61 per cent (by weight) micro particles of polytetrafluoroethylene suspended in water, and stabilized with a non-ionic wetting agent. Most metals and ceramics can be coated, but because the finish must be fused at temperatures of 750 F, it cannot be used on wood or metals with relatively low melt points.

Impregnated fabrics, felts, tapes and laminates (Armalon) combine the chemical inertness, lubricity and high service temperature of TFE with the increased strength and abrasion resistance of supported materials.

TFE fiber has been getting a big play as a bearing material. In high-load, low-speed areas, no lubrication is required, and high molecular structure of the fiber gives it approximately 25 times the tensile strength of TFE resin, with a proportional increase in resistance to cold flow under load.

Fluorinated ethylene propylene, FEP, has a melt viscosity low enough for processing on standard injection molding and melt extrusion equipment. The most important factors in fabrication are (1) that the resin not be degraded, and (2) that the point have a good, smooth surface and a homogeneous structure.

Depending on thickness of the part to be injection molded, 30 to 60 mils per in. shrinkage is allowed in molds for noncritical parts. For accurate dimensions, a test cavity should be used. Few dimensional changes result from stress relieving since the usual service temperature for FEP is equal to, or lower than, the molding temperature.

Using conventional melt-extrusion equipment, coatings of FEP with thicknesses of 3 to 30 mils have been extruded over such materials as silicone rubber, polyvinyl chloride, neoprene, TFE, glass braid, metal-shielded cables, twisted conductors, and parallel-multiconductor cables.

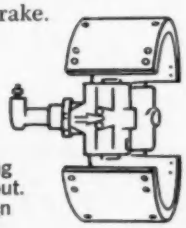
Bright spot for FEP film is that it can be heat sealed to itself or to TFE. This capability indicates potential use in many TFE applications where bonding had previously been a problem.

Allied Chemical's Halon resin can be conventionally injection molded with the exception that cylinder and mold temperatures are higher, and injection pressures of 15,000 to 25,000 psi are common. Generally, the best molded piece is produced by using the lowest cylinder temperature, the highest mold

ACTUAL TESTS PROVE:

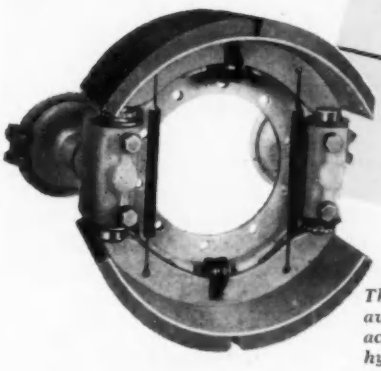
NEW STOPMASTER BRAKE IS the most advanced brake design in 30 years!

Over three years of thorough and demanding road tests have proven the superiority of the new Rockwell-Standard Stopmaster Brake. Of its many new improvements the Stopmaster incorporates these major advantages to meet the modern trucking industry's demand for a more efficient, more dependable brake.



New Stopmaster actuation principal results in higher braking efficiency with less input. In dual actuation design both shoes do an equal amount of work over the entire lining surface. This balanced shoe action assures more dependable service; faster, surer stops; less maintenance.

New Stopmaster 15" diameter permits increased air circulation between brake drum and wheel rim. This results in cooler operating temperatures . . . less heat fade, longer lining life, longer drum life. Smaller diameter means less weight.



AVERAGE RESULTS OF NUMEROUS HIGHWAY VEHICLE TESTS PROVE:

35% lighter weight.. more payload capacity!

38% less heat fade.. safer, more continuous operation!

57% less air volume required.. permits smaller air reservoir tanks!

56% longer lining life.. lower operating cost, less maintenance!

56% longer drum life.. more dependability, less downtime!

66% less adjustment required.. greater safety, reduced maintenance!

37% less service parts smaller inventories, less expensive!

The Stopmaster 15" Brake is available with either air or hydraulic actuation . . . also up to 30" diameter, with hydraulic actuation for heavy-duty, off-highway vehicles.

Another Product of... **ROCKWELL-STANDARD CORPORATION**

Brake Division, Ashtabula, Ohio

temperature and the highest cylinder pressure possible within the range of conditions as follows:

Grade (°C)	240-300
Cylinder Temperature (°F)	470-570
Cylinder Pressure (psig)	15,000-25,000
Mold Temperature (°F)	205-230

(These conditions are suggested only as a guide)

Halon can be successfully extruded by the same methods normally used for the extrusion of polyethylene. This includes the extrusion of rod, tubing, flat film, blown tubing film and wire coating. Pellet form resins are recommended.

Standard extrusion equipment capable of producing temperatures up to 700 F at the die can be used. Electrical heating is suggested to obtain and accurately control these temperatures to prevent overheating and degrading of the plastic, particularly at the die.

Kel-F (Minnesota Mining & Manufacturing) is supplied to processors as a high or low density molding powder. It is molded with conventional equipment to operate between 450-650 F by compression, transfer, injection or extrusion.

By heat treating at temperatures between 300-380 F, it may be crystallized and rendered considerably harder and less yielding. This characteristic offers a wide choice of physical properties using the same basic resin. Stress relieving can be done for 24-48 hours at temperatures up to 400 F.

Also available as a dispersion, Kel-F may be applied by spray, spread or dip. Flex life of molded products can be extended by using lower molecular weight, highly fluorinated oils with the same basic chemical structure as the plastic. Use of these plasticizers yields softer, more pliable and tougher products.

Pennsalt Chemical's new vinylidene fluoride resin, Kynar, can be readily molded and extruded. Although injection molding conditions are dependent upon the size of the shot and the design of the cavity, cylinder temperatures should range from 425 F at the feed end to 525 F at the nozzle. Optimum mold temperature of 200 F reportedly gives good flow and still provides for rapid conversion of resin to its hard crystalline state. Because of its relatively high melt viscosity, molding pressures are in the order of 15,000 to 20,000 psi. To minimize shrinkage, temperatures should be kept low and pressures reasonably high.

Kynar can be extruded into shapes, rod, tubing, sheet, wire coating and cable jackets. Recommended barrel and die temperatures range from 380 F at the throat to 480-525 F at the head.

Kynar dispersions permit the formation of continuous films at temperatures lower than the crystalline melt point of the polymer. Optimum strength is reached after fusing film at 370-420 F. Pennsalt Chemical says that films, 0.008 to 0.10 in. in thickness, have been cast and sprayed on to flat metal surfaces in one pass.

Elastomers

Fluorocarbon elastomers, such as du Pont's Viton and 3-M's Fluorel, are probably the best answers to the problem of providing resistance to heat and corrosive chemicals and obtaining maximum resiliency. As

In the Lipe Spotlight...

Shay's Service, Inc.
Dansville, N. Y.

"LIPE CLUTCHES

cut our clutch maintenance problems to a minimum!"

"As an LTL Carrier working in a 75-mile area, our trucks make up to 50 delivery stops a day," declares Maintenance Supervisor Alton Isaman. "That makes clutches one of the most vulnerable spots in the power train.

"When we started replacing with Lipe, we cut our clutch maintenance problems to a minimum."

Mr. Isaman continues: "Whether we measure them by cost per ton-mile, number of disengagements, down-time or labor, the Lipes give distinctly superior service. What's more, *every* clutch in our 65-unit fleet . . . original and replacement . . . will shortly be changed over to Lipe."

Continuing experiences like these show how, with fleets everywhere . . . .

LIPE DELIVERS IN THE CLUTCH

© LIPE—ROLLWAY CORPORATION, SYRACUSE, NEW YORK

a product class, they also exhibit a high modulus and good tensile strength coupled with excellent resistance to oxygen, ozone and weathering.

Big drawbacks are relatively poor performance at low temperature, high cost and slow processibility.

Viton, a copolymer of vinylidene fluoride and perfluoropropylene, is highly resistant to oils, fuels, lubricants, most mineral acids, and to many aliphatic and aromatic hydrocarbons that act as solvents for other rubbers.

It is not recommended, however, for service in low molecular weight esters and ethers, ketones, certain amines, hot anhydrous hydrofluoric and chlorosulfonic acids, and some proprietary fluids such as Skydrol 500. ■

BOOKS ...

ECONOMICS AND AMERICAN INDUSTRY, *by Leonard W. Weiss, published by John Wiley & Sons, Inc., 440 Park Ave., South, New York 16, N. Y. Price, $7.50.* This new survey of American industry supplies a new interpretation of structure and theory, and a better means of teaching basic courses in economics. These studies embrace the fields of agriculture, textiles, aluminum, electric power, steel, automobiles, and retailing.

MAGNETIC CONTROL OF INDUSTRIAL MOTORS (PART II), A-C MOTOR CONTROLLERS, *by Gerhart W. Heumann, published by John Wiley & Sons, Inc., 440 Park Ave., South, New York 16, N. Y. Price, $9.* Controllers for industrial type A-C and D-C motors are carefully analyzed. Motor performance data for the A-C squirrel-cage, wound rotor, and synchronous motors are presented as well as data on D-C series and shunt motors.

THEORY OF METAL CUTTING, *by Paul H. Black, published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Price, $7.50.* Here is a scientific analysis of the metal-cutting operation. It collects and interprets the theories and conclusions concerning what happens at and near the point of a cutting tool. It should be of help in specifying machining operations and schedules to increase production rates of parts made of common materials, and of materials still in the developmental stage.

EFFECT OF SURFACE-ACTIVE MEDIA ON THE DEFORMATION OF METALS, *by V. I. Likhtman, P. A. Rebinder and G. V. Karpenko. Published by Chemical Publishing Co., 212 5th Ave., New York 10, N. Y. Price, $5.75.* The significant contributions of Soviet scientists in controlling the microstructure and fundamental properties of metals and alloys are presented in this concise translation. Their research led to the discovery of a number of new effects resulting from the interaction, chiefly by adsorption, between a deformed metal and the surrounding medium containing a surface-active agent.

For advanced fuel...hydraulic...lube systems,

New materials prove ideal in handling temperature extremes −350° F. to +750° F.

Working with two remarkably versatile elastomers, C/R Sirvene engineers are producing flexible molded parts for many vital fuel, lubricating, hydraulic and pneumatic systems. One, Viton-A*, can be compounded to produce parts that function dependably at 600° F., and for short periods up to 750° F. The other important feature of Viton compounds is their excellent resistance to corrosive chemicals, chlorinated solvents as well as both synthetic and petroleum base fuels and lubes. At the other extreme, C/R compounded Silastic LS-53** parts are providing low temperature operation down to -80° F. They also exhibit excellent resistance to synthetic and petroleum base fluids up to 350° F., and function well in propane up to 500° F. For temperatures as low as -350° F., C/R recommends Teflon* compounds.

C/R Sirvene engineers have an intimate knowledge of these elastomers. They also have perfected special techniques in processing which still further improve the physical properties of the molded parts. If your problem involves high or low temperatures, close tolerances, and compatibility in advanced design fuel, lubricant or hydraulic systems, get in touch with us at once. We have the skill and the facilities to help you.

* DuPont registered trademark
**Dow-Corning registered trademark

CHICAGO RAWHIDE MANUFACTURING COMPANY

SIRVENE DIVISION, 1205 ELSTON AVENUE • CHICAGO 22, ILLINOIS
Offices in 55 principal cities. See your telephone book.
In Canada: Chicago Rawhide Mfg. Co. of Canada, Ltd., Brantford, Ontario
Export Sales: Geon International Corp., Great Neck, New York
C/R PRODUCTS: C/R Shaft & End Face Seals • Sirvis-Conpor mechanical leather cups, packings, boots • C/R Non-metallic gears

C/R

Circle 159 on Inquiry Card for more data

New Allis-Chalmers Engine Plant

(*Continued from page* 67)

procedure was considered to be more economical than an investment in a machine with an automatic tool changing mechanism.

Another advantage of the Cleereman machines to A-C is that they can be employed as jig borers whenever such operations are required by the tool room. This machine holds spacing to a tolerance of 0.0007 in., thus making it ideal for this purpose.

The Snyder machine too is equipped with tape control. As illustrated, it will be seen as a more complex piece of equipment, embodying four individual heads. This machine is used on flywheels for adding special holes or bores in various locations to fit the needs of a given installation. In the commercial engine business there is little interchangeability of flywheels even for the same engine models. Although size and general machining operations may be common to a number of flywheels, each one requires one or more special holes in special locations.

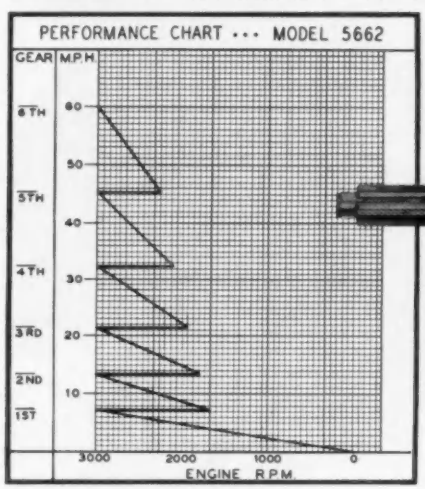
While we do not have an estimate of variations, suffice it to say that flywheel part numbers run in the thousands. Obviously, the tape controlled machine offers the fastest, most economical, and most reliable method of handling the problem.

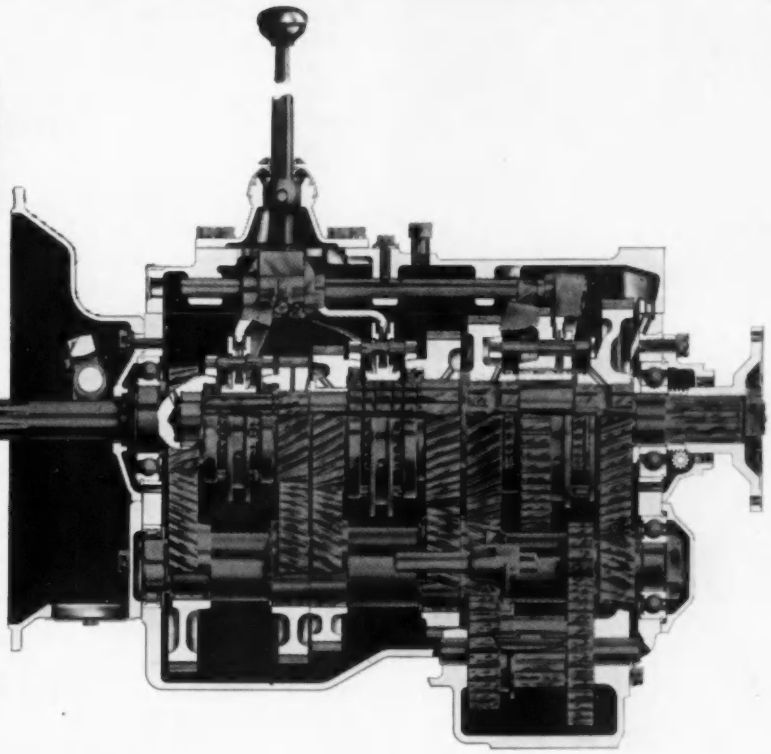
As seen on the floor plan, there is a bay devoted to automatic screw machines. In a busy plant there is a problem of how to store bar stock and tubing; and how to get the material to an individual machine. This plant has developed a neat solution. As illustrated here, they have provided a massive steel structure for storing raw material in sheet steel racks. Key to the entire operation is a special 3-ton Whitney Tranbeam which serves the function of a fork truck. Its advantage over a truck lies in the simplicity of the mechanism. The fork itself has unlimited movement up and down, and across the bay, and has 360-deg of movement in the horizontal plane.

The crane serves to unload material from a truck, move the material to the proper location on the

NEW SPICER 6-SPEED TRANSMISSION Offers Smoother, Faster Shifts For Over-The-Road Trucks!

GEAR RATIOS OF SPICER 5662 6-SPEED TRANSMISSION							
GEAR	Reverse	1st	2nd	3rd	4th	5th	6th
RATIOS	8.25	8.23	4.56	2.80	1.85	1.32	1.0





Direct Drive in 6th for High-Speed Engines

The New Model 5662 Spicer 6-speed transmission has direct drive in sixth, an 8.23 to 1 low gear ratio, a conventional shift pattern, and closer shift steps in top gears for more efficient highway performance. The top five speeds are fully synchronized for faster, smoother, no-clash shifting. Nominally rated at 375-400 lbs. ft. torque, the new unit is an ideal transmission for vehicles in the 60,000 GCW range.

Operators of trucks with 5-speed transmissions, particularly those with supplemental gearing who don't use all available ratios, will find the new Spicer 6-speed can eliminate the additional weight associated with such gearing.

The model 5662 6-speed teams up well with Spicer's newest 12″ two-plate, spring loaded clutch, and operates smoothly with Spicer's old reliables, the 14″ and 15½″ multiple lever, single-plate clutches. Cast iron case has standard SAE 6-bolt apertures for side-mounted PTO's. Case also adaptable for conventional overhead or remote control shifting.

For full information on the new Spicer Model 5662 transmission, write to Dana Corporation, Toledo 1, Ohio.

DANA Spicer **DANA CORPORATION**

Toledo 1, Ohio

SERVING TRANSPORTATION—Transmissions • Auxiliaries Universal Joints • Clutches • Propeller Shafts • Power Take-Offs Torque Converters • Axles • Powr-Lok Differentials • Gear Boxes • Forgings • Stampings • Frames • Railway Drives

Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario

Circle 161 on Inquiry Card for more data

storage rack, and finally to pick up a rack of material and transport it directly to an automatic. Fast, efficient, economical, it requires only the crane operator for most of these functions. It has a plus feature too. The fork lift mechanism incorporates an accurate scale, thus making it possible to weigh the exact amount of raw material for each delivery.

Magnaglo inspection, an essential piece of equipment in most plants, is used here for checking all connecting rod forgings. The familiar form of line machine with a hooded enclosure for black-light inspection is used for this purpose.

Another innovation is found on the receiving conveyor. Here is a flush type slat conveyor, running parallel to the side wall and located near the dock. The problem is to deliver the material to an area at right angle to the receiving dock. It is a problem because a heavy duty slat conveyor, wide enough to handle the crates and boxes, simply cannot make a right angle turn.

The solution was found in an ingenious machinism at the turn. As illustrated, it consists of a fixed curved grid on which the load can ride. In each of the spaces of this grid there is a movable curved bar. The entire set of these movable bars is forced to move upward in a cycle of short vertical movements, actuated by a cam mechanism. This serves to inch the boxes around the corner until they engage the slat conveyor that transports them to the receiving inspection bench. Thus the conveyor system at this point consists of two independent, power-driven slat conveyors, and the curved quadrant at the corner.

At the present writing A-C has seven basic cylinder blocks for the gamut of engines. Before blocks are routed to the machine line, they are delivered to a central inspection station for acceptance. First, there is a sampling inspection for hardness in the Brinell testing machine, followed by a physical inspection of the same samples. Here the operator is provided with a multiplicity of gages in the form of gaskets for the banks and other critical areas, enabling him to determine whether there is sufficient stock for machining. If any of the

Pulsating piston pack by Mather about 1628

LET MATHER SOLVE YOUR SUSPENSION PROBLEMS, TOO

If ever a goat could get a goat's goat, the goat in the foreground has got the goat of the goat in the background. And little wonder because the super suspension credited to Mather engineers makes for easy pulling and riding. If you have a suspension problem, rely on Mather's 50 years of research, design, engineering and manufacturing experience.

50 YEARS MATHER

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criteria established for the sampling inspection fails to meet the specifications, the entire lot is rejected and becomes subject to 100 per cent inspection.

Finally, it is worth noting that all power and plant service facilities are housed in a separate building on the property away from the manufacturing plant. Fuels and lubricants are stored underground near the service building and are piped to points of use in the plant and in the test area.

In addition, the plant has its own water reservoir in a 250,000-gal tank on the property. Being in a small community, the plant probably requires more water than does the city and the make-up for this tank, as well as several other tanks serving the plant complex, is handled by the city water department during the night hours when water usage is at a minimum. ■

Part II of this article, devoted to the new Harvey Engine Plant of Allis-Chalmers Manufacturing Co., will appear in an early issue of AUTOMOTIVE INDUSTRIES.

MORE GOVERNMENT CONTRACT AWARDS

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period Aug. 1 to Sept. 1 inclusive.

CATERPILLAR TRACTOR CO., Peoria, Ill.
Tractor & Motor Grader, 2 ea.—$41,337

CHRYSLER MOTORS CORP., Washington, D. C.
Trucks, Medium, 7 ea.—$24,302

EDWARDS IRON WORKS DIV., COPCO STEEL ENGRNG. CO., South Bend, Ind.
Semi-Trailers, 76 ea.—$223,605

FORD DIV., FORD MOTOR CO., Washington, D. C.
Trucks, 42 ea.—$216,963

FORD MOTOR CO., GOV. SLS. DEPT., Washington, D. C.
Trucks, various, 18 ea.—$78,033

GENERAL MOTORS CORP., FOREIGN DIST. DIV., New York, N. Y.
Trucks, 10 ea.—$14,246

GENERAL MOTORS CORP., GMC TRUCK & COACH DIV., Pontiac, Mich.
Trucks, 4 ea.—$32,045

GISHOLT MACHINE CO., Madison, Wis.
Machine Balancing, 2 ea.—$62,640

INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks, various, 12 ea.—$97,725

KEARNEY & TRECKER CORP., West Allis, Wis.
Machine, Horizontal Spindle Boring, 1 ea.—$317,118

MARSHALL & HUSHCHART MACHINERY CO., Chicago, Ill.
Lathe, Turret, Vertical, 1 ea.—$131,535

PESCO PRODUCTS DIV., BORG-WARNER CORP., Bedford, Ohio
Motor, DC Series, 450 ea.—$43,983

SHEFFIELD CORP. (The), Dayton, Ohio
Comparator, Gage Block, $31,598

SHEFFIELD CORP. (The), Dayton, Ohio
Grinder, Plunge, 1 ea.—$59,627

SIE DIV., DRESSER ELECTRONICS, Houston, Texas
Semi-Trailers, 46 ea.—$151,208

STUDEBAKER PACKARD CORP., South Bend, Ind.
Trucks, Medium, 7 ea.—$22,671

TINIUS OLSEN TESTING MACH., Willow Grove, Pa.
Machine, Testing, $35,580

BOOKS...

AN INTRODUCTION TO TRANSPORTATION ENGINEERING, *by William W. Hay, published by John Wiley & Sons, Inc., 440 Park Ave., South, New York 16, N. Y.* Here is a unified exposition of the basic principles and problems involved in the operation of all modes of transportation. The author is Professor of Railway Civil Engineering at the University of Illinois and a widely known railroad expert.

MACHINERY NEWS

(*Continued from page 87*)

Around the Industry

DeVlieg Machine Co.—recently completed a $20,000-sq-ft factory addition at Royal Oak, Mich., three years after building a brand new 130,000-sq-ft plant which, at the time, doubled the company's floor space.

Steel Improvement & Forge Co.—has concluded an agreement with The Birmingham Small Arms Co., Ltd., of Birmingham, England, whereby B.S.A. Tools, Ltd., will build Steel Improvement's electrochemical metalworking machines (AI, Dec. 1, 1960, page 60) and market them in the United Kingdom, British Commonwealth of Nations (except Canada), and in 11 other foreign countries. Early this year Steel Improvement made a similar contract with Ex-Cell-O Corp. covering markets in the United States and Canada, West Germany, Austria, Switzerland, Holland, and Japan.

Cincinnati Milling and Grinding Machines, Inc. — C. J. "Jack" Loviner has been appointed manager of the Detroit office, located at 24100 N. Woodward Ave., Pleasant Ridge, Mich. Joseph P. Baldez, former manager, has been transferred to Washington on special assignment.

Norton Co.—has established a new department within its Abrasive Div. for developing new products. John C. Ewer will head the department as manager of product and market planning. One of the department's first projects is the development of further information on abrasive machining.

E. W. Bliss Co.—Carl E. Anderson has been elected president and chief executive officer. Mr. Anderson previously was director of general management consultation for Ebasco Services, Inc.

Michigan Tool Co.—Paul N. Gustafson has been appointed manager of the Cone-Drive Gears Div., succeeding Fred E. Birtch who retired July 31. George A. Schimmin has been advanced from assistant sales manager to sales manager of the Div. ■

MANUFACTURERS' NEWS

Budd's Brake Expansion

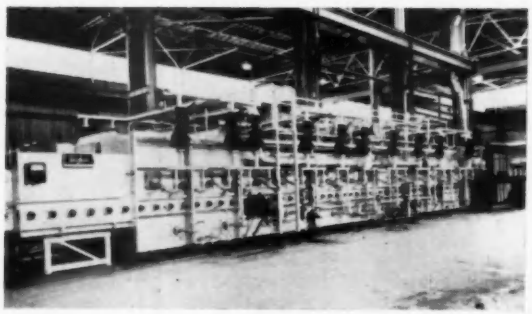
The Automotive Div. of the Budd Co. has announced establishment of a new engineering section to expand Budd's activities in the development and production of automobile and truck-trailer brakes and drums. Paul G. Hykes, formerly head of Budd's wheel engineering, has been named Executive Engineer, Brakes, to direct the new group of engineers. Roy C. Norton has been promoted to Executive Engineer, Wheels.

Enjay, Stevens in Deal

Enjay Chemical Co., a division of Humble Oil & Refining Co. and J. P. Stevens & Co., have purchased the operating assets and facilities of National Plastic Products Co. Enjay and Stevens have been engaged for more than a year in a joint research project to develop the manufacture and utilization of textile fibers from polypropylene plastic.

New Copper, Brass Tube Mill

In its new 293,000 sq ft plant at New Milford, Conn., Scovill Mfg. Co. is using two modern continuous roller hearth bright annealing furnaces as the central point in the quality control of brass tubing. A direct fired continuous



Side View of 193 Ft. Annealing Furnace

annealing furnace in the "re-draw" line and a convection "finishing" line are designed to handle brass or cupro-nickel tubing from six to 60 ft long. They will heat 15,000 and 8000 lbs of work per hour, respectively. Scovill engineers and Surface Combustion Corp. developed the new concepts of heat treat control.

Rockwell-Standard Backlog Mounts

The $82.6 million backlog of unfilled orders on July 31 was the largest in the last 17 months and indicates previously expressed optimism

(Turn to page 126, please)

'62 Chrysler Cars

(*Continued from page* 72)

grade fuels. Optional engines are: 318-cu in. V-8 with four-barrel carburetor; 361-cu in. V-8 with four-barrel carburetor and dual exhausts.

Improved fuel economy is promised by the introduction of new automatic transmissions as well as lower rear axle ratios.

Self-adjusting brakes with bonded linings are standard. The instrument panel features a printed circuit layout.

The Valiant Line

WITH the addition of the Valiant Signet 200—said to be the lowest priced hardtop with bucket seats—the Valiant line for 1962 offers seven models. The Valiant Signet 200 is intended as a sports model and has been made distinguishable in styling and interior treatment from the rest of the line.

Significant styling changes appear in the treatment of the front and rear, with new rear deck, rear fenders, and tail lights. The front grille is larger and is made of fine horizontal bands of anodized aluminum. A rolled stainless steel drip rail molding is standard on the Valiant Signet 200.

The 170-cu in. Six is standard equipment; the 225-cu in. aluminum block engine is optional. Both engines operate on regular grade fuels. Due to a new type of engine mounting, both engines run smoother. Additional smoothness is imparted by revised camshafts, modified to effect smoother idling and quieter operation.

In addition to the Valiant Signet 200, three models are available in each of the V-100 and V-200 series: four-door sedan; two-door sedan; four-door and two seat station wagon.

Brake linings are bonded to shoes in this line. The instrument panel features a printed circuit. Life of the exhaust system has been extended by use of aluminized steel in the headers and shell of the muffler; and a thicker-walled tail pipe.

Details of significant mechanical improvements will be found in the summary article in this issue. ■

WHY HEAT TREAT?

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Unique combination of 8 properties

Why do you bother with the costs and troubles of heat treating your machined parts? Make them out of Strain-Tempered bars, another Bliss & Laughlin first.

Strain-Tempered can be tailored to meet your field service requirements for:

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- Comparable wearability
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You pay only for the strength and machinability you really need. In Strain-Tempered steels the selection is wide, from the industry's most complete line of high strength cold finished steel bars. This includes both carbon and alloy analyses, leaded or unleaded.

Let us show you how Bliss & Laughlin can cut your costs and get rid of your heat treating headaches.

Bliss & Laughlin has been producing cold finished steel bars for 70 years, Strain-Tempered bars for 30 years. Call on this experience!

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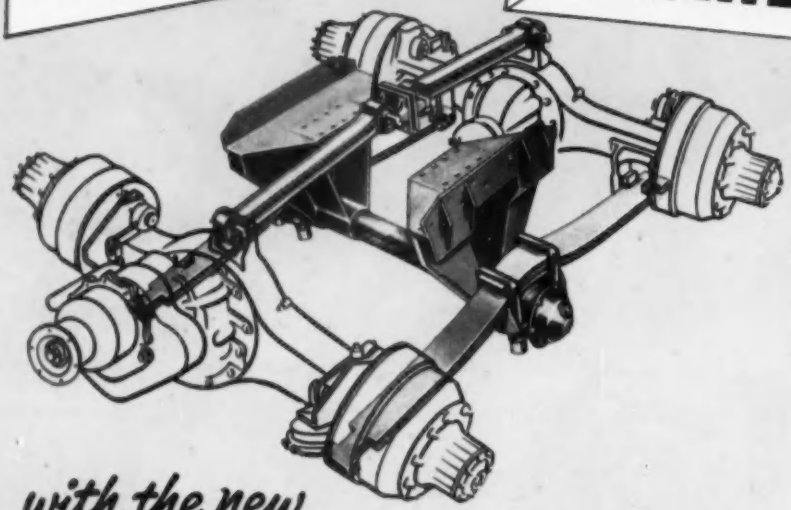
PAYLOADABILITY *with* RIDEABILITY



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- UP TO 434 LBS. MORE PAYLOAD
- A SMOOTHER RIDE LOADED OR EMPTY
- LESS WEAR AND TEAR ON TRUCK AND CARGO

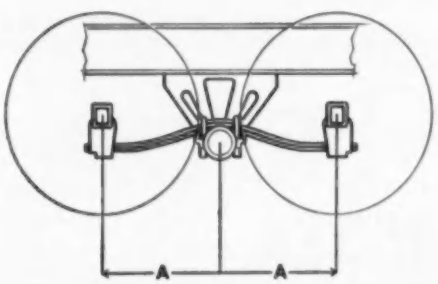
with the new

ROCKWELL-STANDARD TANDEM SUSPENSION

COMPLETELY NEW IN DESIGN... EXCLUSIVE "TAPER-LEAF" SPRINGS MEAN LESS WEIGHT— MORE PAYLOAD

It isn't the amount of spring steel but the way that it is used that gives strength to springs. With only *two* long tapered leaves in each spring Rockwell-Standard can achieve the same strength and load carrying capacity that standard suspensions can carry with multi-leaves...and at less than half the weight.

Optional aluminum frame support brackets and torque rods cut suspension weights by almost 25%.



BALANCED "CRADLE-RIDE" FOR SMOOTHER GOING—LOADED OR EMPTY

Balanced design with long resilient springs assures an easy buoyant ride and reduces vehicle hopping, pitching and swaying. Because of greatly reduced inter-leaf friction even slight road imperfections are absorbed. This shock absorbing action keeps vehicles tight, minimizes maintenance, reduces cargo damage and makes handling easier on or off the road.

Another Product of... **ROCKWELL-STANDARD CORPORATION**

ROCKWELL R STANDARD ®

Transmission and Axle Division, Detroit 32, Michigan

Titanium-Carbide Tool Materials

NICKEL and molybdenum are the bonding agents used in the new titanium-carbide (TiC) tool materials developed by Ford Motor Company's Scientific Laboratory. These new materials have a very fine-grained structure with a uniform dispersion of titanium-carbide throughout the metal.

The steel-cutting grades of TiC materials have a hardness range of 90 to 93 Rockwell A. At present, a nominal composition of 80 per cent titanium-carbide, 10 per cent nickel and 10 per cent molybdenum has been fully developed for semi-finish and finish machining. Other combinations are being studied for possible use in rough machining operations, as well as in interrupted cuts.

The first efforts were directed toward better understanding and control of the factors that determine the microstructure of the materials. The use of nickel alone resulted in excessive carbide grain growth during sintering. When molybdenum was added, however, the uniform dispersion was obtained and the fine carbide grain size was held that led to the improved hardness, strength and impact resistance of titanium-carbide materials.

Results obtained from standard machinability tests are said to show a major improvement in tool life over steel-cutting tungsten-carbide materials. Considerable experience with the materials in actual production operations at the Ford Rouge plant and at other Ford plants proves the effectiveness of titanium-carbide tool materials. These tests involved the use of brazed, as well as mechanically clamped, tool bits.

On semi-finish and finish steel turning operations at normal cutting speeds, titanium-carbide tools have shown up to seven times better life than the usual grades of tungsten carbide. On finish turning steel in the usual Brinell Hardness range at high speeds, titanium-carbide is superior to all ceramics tested at the Ford plants.

According to the Vascoloy-Ramet Corporation, titanium-carbide (VR-65) will cut most steels, including stainless, and also cast iron. Following are results that have been obtained:

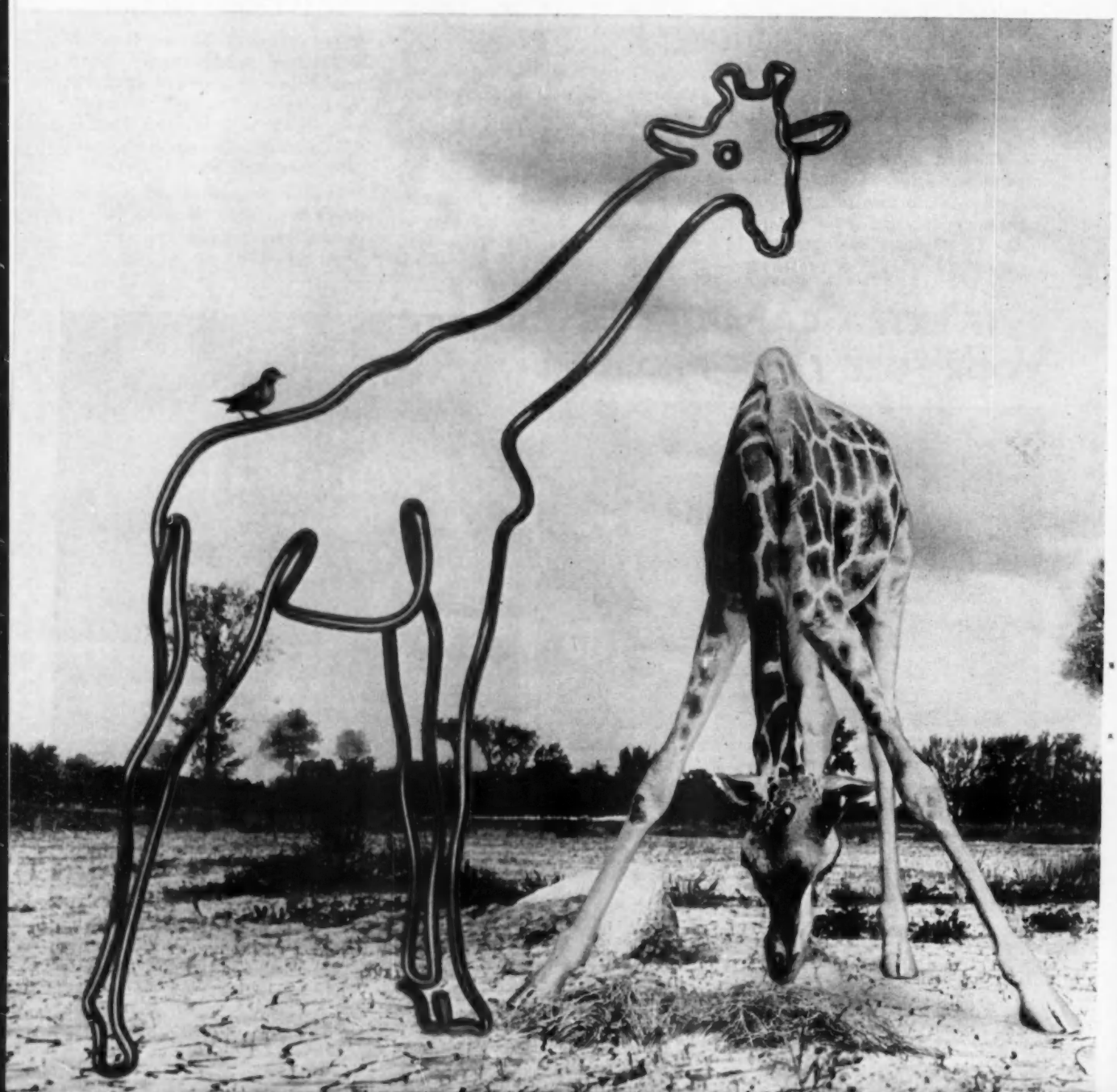
Material	Tool Life	Average Finish	Speed Ranges SFPM
Steel—Mild	Excellent	12 RMS	600-1800
Heat treated up to 40 RC	Good	25 RMS	300- 800
Cast Steel	Excellent	65 RMS	400-1000
Cast Iron	Good	—	200- 600
300 Series Stainless	Good	20 RMS	250- 700
Monel	Good	—	300- 800
Ilium Alloy	Fair	—	90

Results shown are average and do not represent the best that can be obtained. Speed ranges shown have been far exceeded in many instances. However, this is dependent largely on such conditions as tool rigidity, interruptions, machine conditions, etc.

In all cases tool life when using titanium carbide exceeded that of conventional carbides and the rat-

(*Turn to page* 124, *please*)

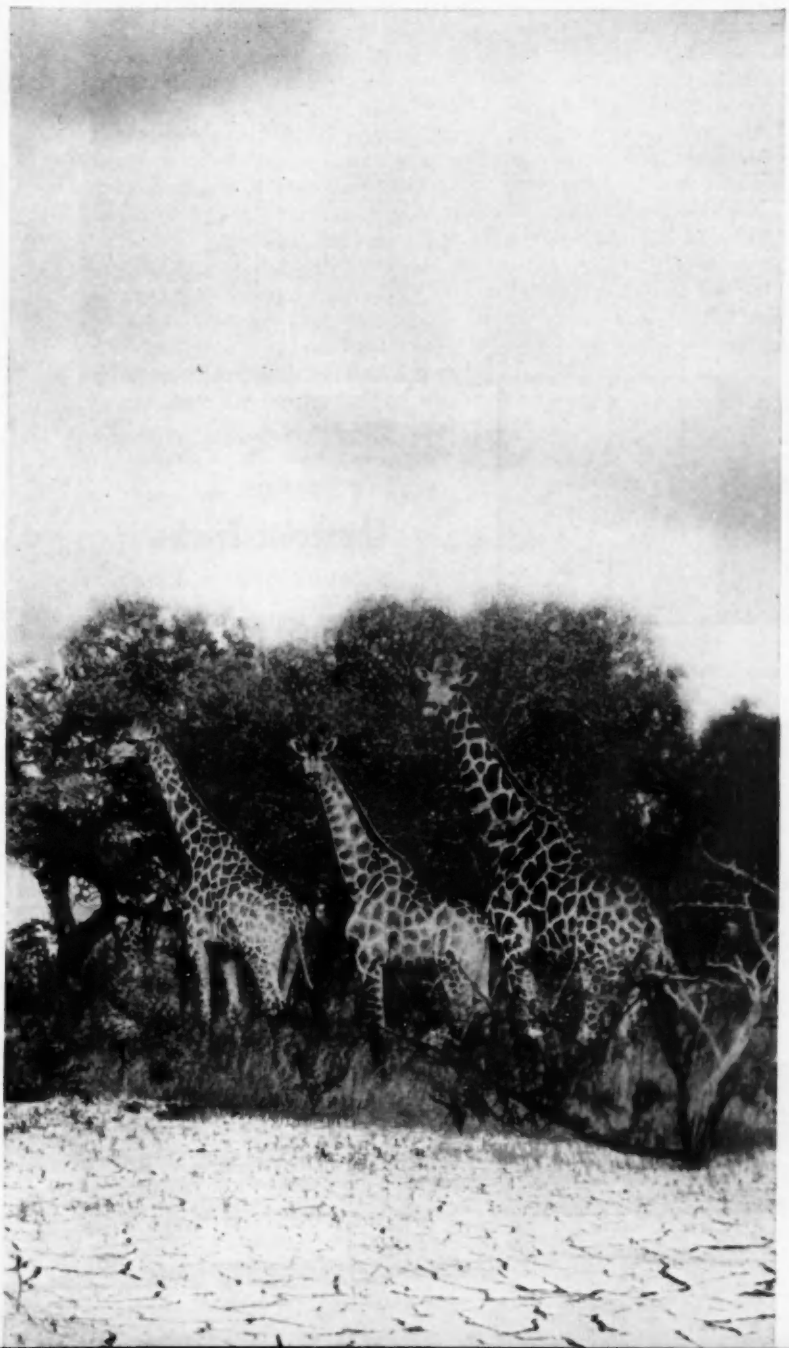
Bundy can mass-fabricate practically anything

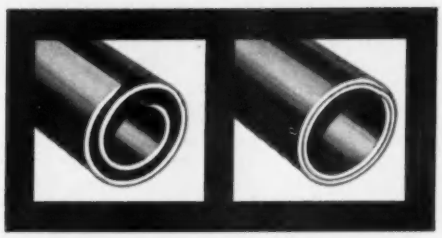


No matter how you need your tubing . . . as simple bends or complex shapes, in orders of several hundred or several million . . . Bundy can supply it. And no wonder: There are very few things you can't do with Bundyweld® steel tubing. Standard wall thickness and O.D. are held to +.002″ to −.003″ and it meets Govt. Spec. MIL-T-3520, Type III; ASTM 254; and SAE specifications. With the special machines developed by our engineers, Bundy gives you every possible mass-fabrication cost advantage on your tubing requirements. Get the complete story by talking to Bundy before you order. Call, write, or wire: Bundy Tubing Company, Detroit 14, Michigan.

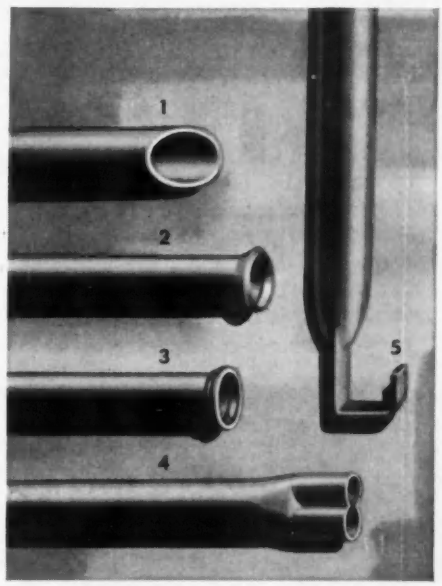
BUNDY TUBING COMPANY • DETROIT 14, MICH. • WINCHESTER, KY. • HOMETOWN, PA.

World's largest producer of small-diameter tubing. Affiliated plants in Australia, Brazil, England, France, Germany, Italy, Japan.





Bundyweld, double-walled from a single copper-plated steel strip, is metallurgically bonded through 360° of wall contact. It is lightweight and easily fabricated . . . has remarkably high bursting and fatigue strengths. Sizes available up to 5/8″ O.D.



Bundy can mass-fabricate small-diameter steel tubing to solve a wide variety of design problems. The Bundyweld steel tubing shown above is: (1) sheared, (2) flared, (3) double-upset, (4) bifurcated, and (5) closed with flattened end.

BUNDYWELD® TUBING

Circle 174 on Inquiry Card for more data

Titanium-Carbide Tool Materials

(*Continued from page* 121)

ings shown are merely indicative of the potential available with this material.

"Excellent" indicates up to 15 times the life of the tool previously used and "good" 8 to 10 times the life of conventional carbides.

Following are a few case studies:

A midwest manufacturing concern is now using VR-65 on a production schedule in the milling of 300 and 400 stainless steel at 1900 sfpm removing 30 cu in. of material per minute.

An operation on 1118 steel using titanium carbide at 1100 sfpm with 0.0025 in. feed averaged 550 pieces per grind. Conventional carbides produced only 340 pieces.

On the finish boring of an SAE 5135 steel gear blank at 300 sfpm conventional carbides produced an average of 60 pieces per grind and titanium carbide as high as 750 pieces per grind.

Tool geometry can be the same as used on conventional carbide tools although, when applied to severely rough or interrupted cuts, strengthening of the cutting edge by negative rake angles is beneficial.

Grinding, where necessary, can be accomplished with diamond wheels using the same practices required in the grinding of the harder or lower cobalt grades of tungsten carbide.

The requirements of the machine tool when using titanium carbide are dependent entirely on the application. An older machine, for example, run at 400 to 1000 sfpm, providing it has the rigidity, can be used to machine a cast steel part within the speed range required. Newer machines with more power required for higher speeds and less inherent vibration will certainly result in optimum performance of the cutting tool, however, applying titanium carbide to operations on older machines should not be overlooked.

Machining of parts having severe interruptions has been applied successfully. Many milling operations are being performed with VR-65 resulting in increased tool life, more cubic inches of metal removed per minute and improved finishes over that which can be obtained with conventional carbides.

Because titanium carbide can be run at higher surface speeds, improved surface finishes are obtained thereby eliminating subsequent grinding operations. On a 316 stainless steel part run at 0.0008 in. feed, 0.003 in. depth of cut and 760 sfpm a surface finish of 3-5 rms is being maintained.

An important gain not to be overlooked is the size control possible because of the high edge wear resistance of titanium carbide. In the machining of SAE 8615 gear blank which required accurate dimensional control 350 pieces are machined to accurate tolerances without adjustment of the machine stops. Previously it was necessary to adjust every 25 pieces to maintain the same accuracy.

Some of the many applications of VR-65 that have been proven in production are the machining of gear blanks, automotive brake drums and transmission parts, missile bodies, steel mill rolls, large implement gear blanks and fly wheels, and a variety of shafts.

Chevrolet Trucks

(*Continued from page* 81)

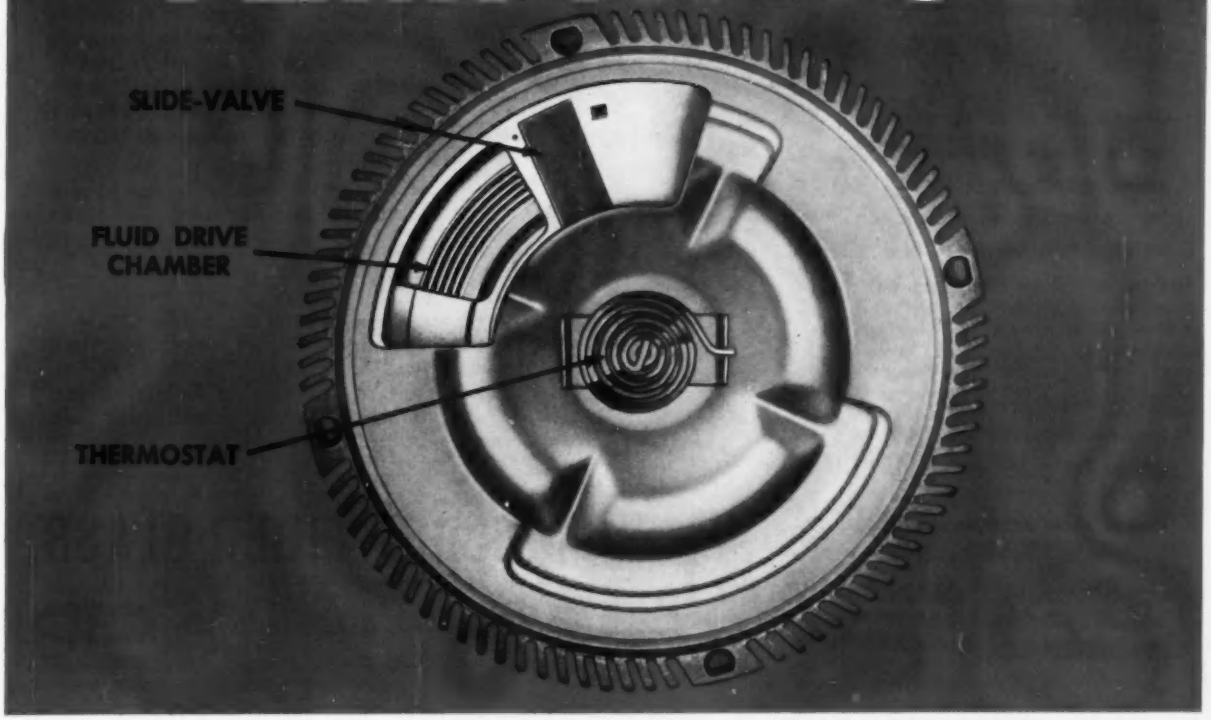
higher power and torque resulting from its greater displacement and new combustion chamber design. With a bore and stroke of 4-5/16 by 3½ in., it develops 252 hp and 390 lb ft of torque.

Other improvements incorporated into the 409 engine include ⅛ in. larger valves and larger ports, larger 2½ in. diameter exhaust manifold outlet.

Development of the 409 has led to incorporation of many of its new features into the 348, resulting in improved efficiency and durability. Innovations common to both engines include piston dome and combustion chamber design, centerline piston pin location, larger valves and ports, larger water pump by-pass, elimination of one cut-out in each cylinder bore, and revision of oil pan configuration. ■

EATON

TEMPATROL



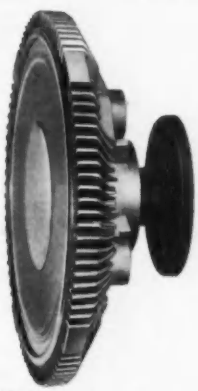
Temperature Regulated Fan Drive Increases Usable HP— Reduces Fan Noise

HOW TEMPATROL WORKS: When under-hood temperature is below the thermostat setting, slide-valve is closed; fluid-drive chamber is empty; the fan idles.

With a rise in under-hood temperature above the thermostat setting, slide-valve opens; fluid enters viscous drive chamber, increasing fan rpm to a pre-determined limit for adequate cooling.

- When cooling is not required, the thermostatic unit causes the fan to idle, thereby increasing net engine output.
- With the Tempatrol Drive engaged, adequate cooling can be achieved at low engine speeds. The top fan speed is controlled to a pre-determined maximum to avoid excessive noise.
- Operational ranges can be established to suit the requirements of each vehicle.

Eaton Tempatrol Fan Drives are readily adaptable to existing installations with only minor changes. They are now operating efficiently on leading motor vehicles. Consult with our engineers on your fan drive needs.



TORQATROL is the torque-regulated version of the Eaton Viscous Fan Drive (without thermostatic control). At low engine rpm, the fan operates at driven speeds. As engine speed increases, the viscous drive slips, limiting the maximum fan speed. Maximum fan speed limit can be raised or lowered to suit the needs of specific installations.

Tempatrol and Torqatrol are fan drive units in the family of Eaton Visco-Drives.®

EATON

MARSHALL DIVISION
MANUFACTURING COMPANY
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MANUFACTURERS' NEWS

(Continued from page 116)

for substantial improvements in 1961, Col. Willard F. Rockwell, chairman, Rockwell-Standard Corp., declared. The backlog is nearly 50 per cent more than at the lowest period in the last 17 months. Col. Rockwell also pointed out that total new orders for June and July exceeded orders in any two successive months in the last 28 months.

Electric Autolite to Expand

Electric Autolite Co. will expand its manufacturing facilities and add new products to its line in Venezuela. The additional manufacturing area will be used for the manufacture of automotive regulators, horns, armatures, and other electrical equipment. The firm, known as Corporacion Venezolana de Acumuladores, S. A., has been producing spark plugs and automotive batteries.

The latest government survey of consumers bears out optimistic predictions for a good car sales year when the new models come out. The Federal Reserve Board reports that an increased number of consumers plan to buy new or used cars during the next year. The percentage of families planning a new car purchase (7.6 per cent) was higher than in April 1961, higher than July, 1960, and even higher than July, 1959.

* * *

Powerful forces in Congress already are forming behind moves to extend defense contract renegotiation rules. The Renegotiation Act of 1951 is scheduled to expire next June 30. But unless industry mounts a major offensive against the act, Congress undoubtedly will extend it. There is even a chance it could be voted into permanent law.

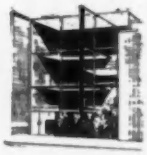
* * *

Hearings are under way in Washington which could boost wages in the machine tool industry. The hearings are to determine the minimum wage for the industry under the Walsh-Healey Act. Following the hearings, the Labor Dept. will study the arguments and make recommendations to Labor Secretary Arthur J. Goldberg. He ultimately will set the minimum wage for the industry. It will apply to all government supply contracts over $10,000.

* * *

It may be good idea for businessmen to brush up on the metric system of weights and measures. There is a chance they will be using it in the future. As wild as it sounds, don't sell the idea short. A bill pending in Congress to authorize a $500,000 study into the "practicability" of replacing pounds and inches with metric measures is supported by the Dept. of Commerce.

AUTOMOTIVE INDUSTRIES

A CHILTON  PUBLICATION

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By C. J. Kelly
ASSISTANT EDITOR

Reamers 1

A wide range of precision reamers (chucking, taper pin, morse and center) is covered in bulletin 761. Included are valuable tips and rules for obtaining maximum efficiency and life from reamers, such as: recommended speeds, feeds, lubricants, Do's and Don'ts and prices. *Precision Twist Drill & Machine Co.*

Data Searching 2

An 8-page brochure describes American Society for Metals' new electronic system of searching technical articles, documents and patents on metals and related subjects for specific mention of any aspect of the subject. Discusses the mechanized way to reduce research costs and "time lag" between conception of an idea and production of the finished product. Shows how subscribers may receive, every two weeks, information on anything published during the preceding two weeks on their field of interest. Explains use of new GE-225 "electronic librarian" that searches through technical articles at the rate of thousands per hour. *American Society for Metals.*

Spring Washer 3

Belleville, Sawtooth Belleville, Arc, 3-Wave and other types of Spring Washers are illustrated and listed so that selection by type or size is easily made. Information concerning Spring Washer characteristics and Garrett's embrittlement free zinc plating process (Garrettizing) is also provided. *George K. Garrett Co., Inc.*

Silicone Fluids 4

A comprehensive technical reference describes a broad range of major silicone fluids. Designated S-9, the 20-page, two-color publication differentiates between available grades of silicone fluids, according to viscosity and classifies them on the basis of physical properties. An index permits the user to select a particular fluid on the basis of properties required in his application. Special features of the reference are a physical data summary chart, which permits easy identification of major grades of materials available, and a silicone fluid selector, in which available silicone fluid grades are identified by major application areas. *General Electric Co.*

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(Please turn page)

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Manifolds 5

A comprehensive 12-page catalog describes a complete line of industrial gas manifolds. Included in this catalog are twenty-one stationary manifolds designed for use with oxygen, acetylene, argon, nitrogen, hydrogen, methane, propane, helium, butane and other industrial gases. Manifolds described range from automatic change-over types that can accommodate unlimited numbers of cylinders to ready-to-install manual change-over types. Many illustrations of actual manifolds are shown. Dimensional layouts of representative manifolds are also included for use in tailoring an installation to a user's exact needs. *Linde Co., Div. of Union Carbide Corp.*

Spray Equipment 6

A complete catalog of all airless spray equipment is now available. The catalog lists specifications and information on a new medium production pump for single gun operation, including available accessories, the heavy duty pump for miltiple gun operation, including portable and tank mounted models, spray guns, including pole and automatic guns, the range of spray caps available, and types of hose and connections. *The DeVilbiss Co.*

Bearing Terms 7

Ball and roller bearing parts and terms are clearly defined and illustrated in a 24-page booklet entitled, "Bearing Parts and Nomenclature of Standard and Precision Bearings." Other subjects include ball installation, dimensions, loads, alignment, types and functions of self-aligning, nonself-aligning, and thrust bearings. Bearing accessories such as shields, seals, snap rings, seats, and housings are also described. *SKF Industries, Inc.*

V-Band Couplings 8

A 16-page booklet entitled "Economics of the V-Band Coupling" gives specific cost comparisons between V-Bands and other joining methods. It also explains how many of the "hidden costs" of manufacturing can be reduced by using V-Band Couplings. Savings in weight and installation or assembly time are examples of other types of economies illustrated in the booklet. *Marman Div., Aeroquip Corp.*

Cooling for Welding 9

A new pamphlet, "The Use of Water Cooling for Welding Equipment," thoroughly covers the use, advantages and problems of water cooling encountered in various welding processes and deals primarily with three types of cooling systems; the use, city water (municipally supplied or wells), central cooling systems, and individual "self-contained" coolant systems. Besides recommending methods of cooling for TIG (Tungsten-Inert-Gas) welding, Gas-Shielded Semi-Automatic (MIG) welding, MIG and TIG Cutting Applications, Automatic Arc Welding, Resistance Welding and Miscellaneous Processes, the pamphlet answers technical problems, such as Cable Voltage Drop, Coolant Flow Rates and Pressures, etc. *Bernard Welding Equipment Co.*

Liquid Oxygen 10

A liquid oxygen cylinder with a capacity of 3000 cu. ft. of oxygen is described in a 4-page booklet. The large capacity cylinder supplies the equivalent of 12 "K" type high-pressure cylinders. The cylinder's weight is 463 pounds and it requires only 1/3 the space in storage or operation as its equivalent in high-pressure cylinders. *Linde Co., Div. Union Carbide Corp.*

Drives & Couplings 11

A simplified method for selecting Flexidyne Dry Fluid Drives and Couplings for most industrial applications is featured in a new 20-page bulletin. Eight stock drives and 11 stock couplings are listed for fractional to 1,000 hp requirements, together with actual pictures and engineering drawings. Introduction explains operating advantages. Bulletin also has tables of weights, dimensions and prices. *Dodge Mfg. Corp.*

Aluminum Coating 12

A new method of producing a highly corrosion resistant coating on aluminum is fully described in technical data sheet number 87, a three-page usage and instruction sheet. Called MACro Alum number 5, the product is a dry chromate base salt used in water solution. Coating colors can be varied from brass to bronze without loss of original brightness. *MacDermid, Inc.*

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Spray Booths 13

Catalog SB-1, 36 pages, describes a complete line of spray painting booths and related equipment. The booklet also covers related equipment such as air exhaust fans, chambers and systems; infra-red ovens; mixing and circulating tanks; pumps; and stand pipes. *Binks Mfg. Co.*

Printed Discussion 14

"Can the Research Scientist Acquire a Management Attitude?" is the title of, and the basic question underlying, a printed discussion now being offered to representatives of industry concerned with research and development. Written by M. R. Nestor, manager of project development, the statement is one of a series on the procedures and characteristics of contract research for industry being published by the research center. Case histories are cited in which the research professional's suggestions for work in areas not previously considered are applauded by management men responsible for their company's research and development activities. *Battelle Memorial Institute.*

Gear Tooth Checker 15

Data sheet 1132 describes new checking system which simplifies analysis of gear and spline tooth-spacing errors. Eccentricity and index errors are separated by graphic means for either straight or helical gears or splines. System makes use of Michigan model 1132 Checker, translucent charts and a light table. Applicable to either laboratory or production checking, the system is discussed in full detail and a typical checking chart is illustrated and explained. *Michigan Tool Co.*

Tap Catalog 16

An all-new tap catalog and tapping handbook covers standard and special taps, illustrates and describes them. All items available from stock are clearly indicated. In addition to the catalog data, the new booklet includes a tap users' guide, trouble shooting section, resharpening instructions, and handy tables on thread constants, acme threads and drill diameters, as well as a glossary of terms. *Besly-Welles Corp.*

Pressure Gauge 17

A new differential pressure gauge is described in a single page bulletin E 10. The bulletin contains specifications, drawings and ordering information. The gauge it describes is a leak-proof model operating by a magnetic coupling. It is designed for indicating up to 60 psid in systems up to 3000 psi. *Pall Corp.*

Material Handling 18

A 66 page book is profusely illustrated with many "on-the-job" photographs showing various items in actual use. Many types of work benches and accessories are listed as well as tool cabinets, stands and benches. Stock carts and trucks are illustrated in various sizes, shapes, and types. Trucks. Dollies, Drum Lifters, Swivel Hoists and Hooks are all well illustrated. Parts cabinets, bins, parts storage inserts are shown in numerous adaptations. *Vince Basnik Co.*

Plastics Fact File 19

A revised plastics fact file describes the properties and typical end uses of a diversified line of materials. The 16-page booklet includes detailed results of American Society for Testing Materials tests on the company's broad range of Lustrex styrene, Monsanto Polyethylene, Opalon vinyl chloride and Lustran SAB and SAN molding and extrusion compounds. In addition, the booklet features general information about the forms, typical uses and characteristics of Monsanto's fabricating, extruding, calendering and laminating materials; industrial, textile, surface and paper coating resins; adhesives and intermediates. *Monsanto Chemical Co.*

New Service 20

The establishment of a new customer service facility to render complete and comprehensive engineering service to end users and fabricators of parts made from silicone molding compounds has been announced. This new product application development service has been named the "Application Service Group, Molding Compounds." A well illustrated eight-page brochure describes the new service and its facilities. *Dow Corning Corp.*

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Advertisers' Products and Services Data; and more information on New Production Equipment and New Products described editorially in this issue.

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Machine Tools 21

A newly revised 48 page catalog, describes a complete line of light-heavyweight machine tools and accessories. Some of the industrial tools described are drill presses, grinders, cut-off machines, bank saws and belt and disc surfacers. Complete specifications, catalog listings and descriptions of accessories for all tools are included. Photos and drawings supplement the text. *Walker Turner Div., Rockwell Mfg. Co.*

Polishing Manual 22

A new 20-page technical manual covers the manual or semi-automatic polishing, burring, satin finishing, buffing and high coloring of metals, plastics, wood and organic coatings on wood. Data includes finish selection, finish appearance and characteristics and the various production factors affecting different surface finishes. Also included are general application tables for various types of abrasive compositions. *Lea Mfg. Co.*

Case Study 23

How do "Fatigue-Proof" Steel Bars compare in machinability and tool life with the other materials is the subject of the third in a series of case study portfolios. A total of eleven case studies are included in the portfolio. *La Salle Steel Co.*

Electronic Tracer 24

Simple pencil line sketches of intricate shapes and forms can now be used to guide oxygen shape-cutting machines with an electronic tracer described in a new booklet. The literature illustrates how a built-in kerf compensator makes it possible to reproduce one or thousands of complicated metal parts with extreme accuracy from exact size drawings. *Linde Co., Div. of Union Carbide Corp.*

Plastic Balls 25

A single, simplified, easy to-use chart contains extensive technical information and specifications for plastic balls. The chart shows the physical characteristics, tolerances and typical applications for seamless balls made out of six different plastic materials including nylon and teflon. The new chart also has a section describing some of the modifications in balls that can be made by the Ace production facilities. *Ace Plastic Co.*

Sound Survey Meter 26

A new two page brochure fully describes a hand-held transistorized sound survey meter. The meter, which weighs only 1 lb including battery, is designed for one hand operation. It may be used in locating the source of potentially harmful sound levels, and in preventive maintenance programs. *Korfund Co., Inc., Acoustics & Instruments Div.*

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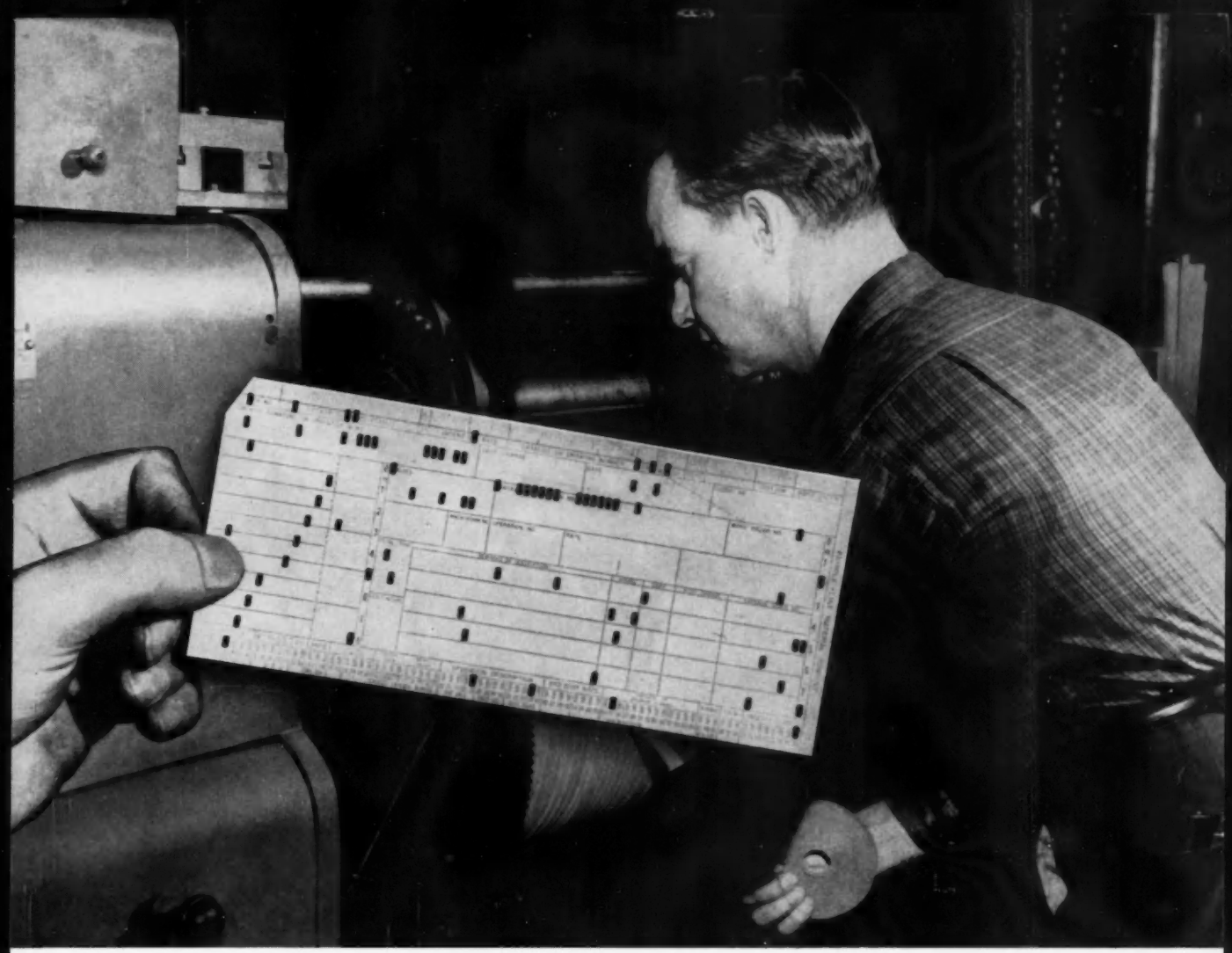

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The employees like the system because it records their production accurately and quickly, and is simple to use.

Each employee inserts his identification card in the 357 station nearest his job location...enters the work codes and number of production pieces on the simple keyboard. Instantly the 357 transmits this information to the data processing center where it joins information coming in from other employees.

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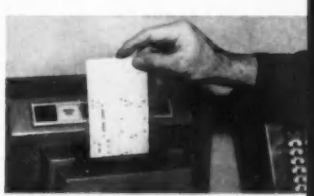

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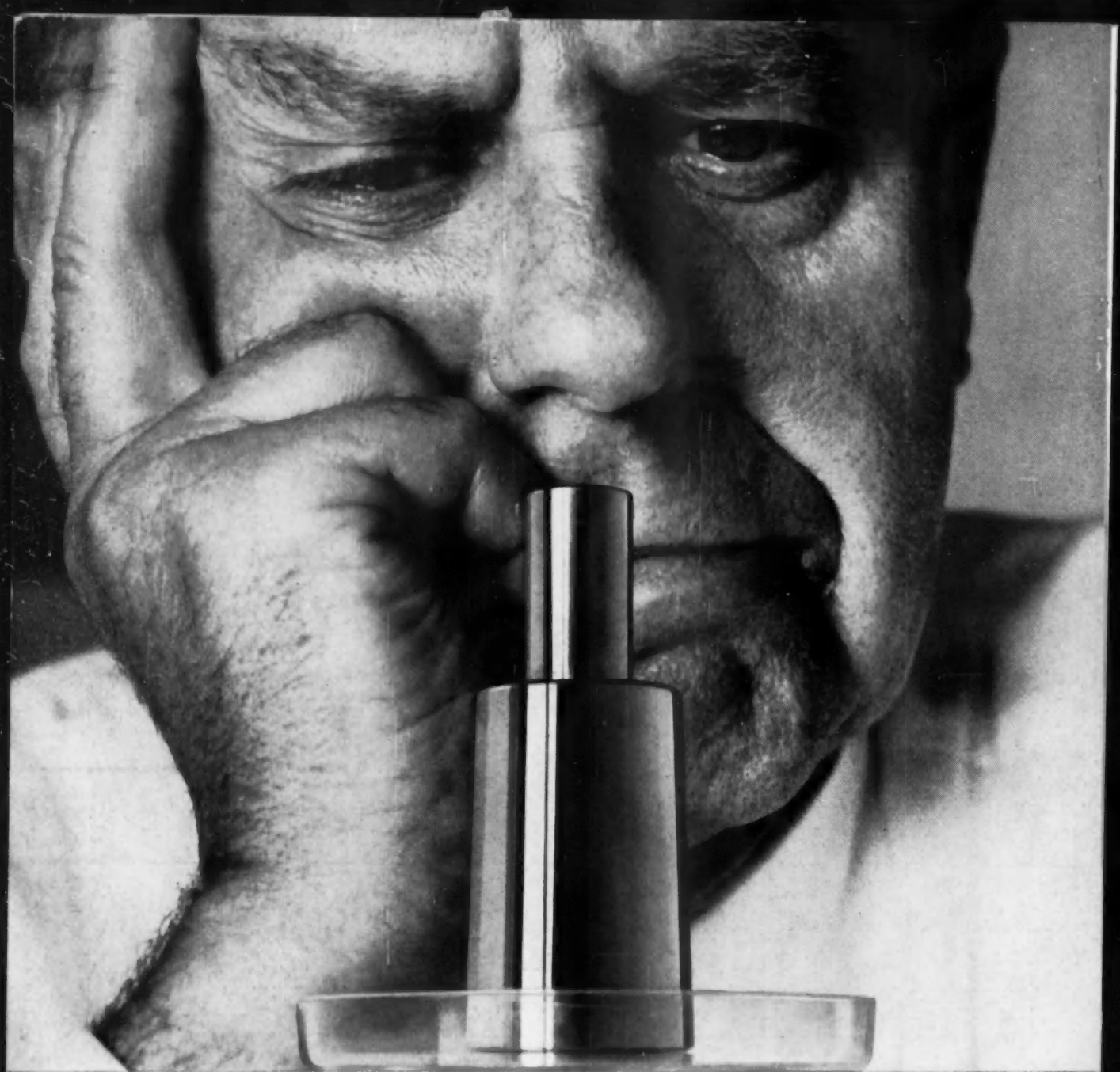

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